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PROCEEDINGS of

THE PRESIDENT'S CONFERENCE ON OCCUPATIONAL SAFETY

March 6-8, 1962
Washington, D.C.

BULLETIN 243

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U.S. DEPARTMENT OF LABOR
Bureau of Labor Standards

On the Value of the Conference . . .

A DELEGATE: I should like to ask how an appraisal of the value of a Conference such as this is made.

MR. TEPLow: I don't think there is any possible way of looking at the statistics and saying, "This is the result of the present Conference." I might point out also the same need be said of most of the activities in which we engage, including public relations, industrial relations, and indeed all of the many facets of our occupations. We can say this: If we have brought to you knowledgeable people who have spoken from the depth of their interest and their background and their specializations—if the utilization of the great office of the President of the United States to raise the level of importance of the safety function has been useful—if you have gathered . . . some pointers or nothing more than inspiration, from the participants, the panelists, the speakers—if you have gathered . . . the inspiration to do a better job than has been done in the past—then the Conference has been worthwhile. [Applause].

(From the verbatim transcript of the closing Plenary Session, President's Conference on Occupational Safety, March 8, 1962.)

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PROCEEDINGS OF

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THE PRESIDENT'S CONFERENCE ON
OCCUPATIONAL SAFETY Washington

March 6-8, 1962

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U.S. DEPARTMENT OF LABOR

Arthur J. Goldberg, Secretary

U.S. BUREAU OF LABOR STANDARDS, + 7a
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Arthur W. Motley, Director

A MONG THE services it renders to the President's Conference on Occupational Safety, the United States Department of Labor issues this bulletin as the official record of the 1962 meeting. In this document will be found the Report to the President and the Nation—comprising the Conference conclusions—together with the major addresses and the presentations of panelists and speakers at the several Conference Workshops.

Foreword

IN calling the eighth biennial meeting of the President's Conference on Occupational Safety, to be held March 6-8, 1962, President John F. Kennedy said:

"Although the rapid pace of scientific and technological advance has minimized certain risks encountered by the working people of the Nation, it has also added new hazards to the old ones which are tragically familiar to us all. Such advance must not be made with unnecessary sacrifice of human life and limb."

This accelerated technological progress, coupled with a burgeoning population and a fast-growing economy prompted planners of the 1962 Conference to outline two simultaneous approaches to the safety challenge inherent in a period of dynamic growth and change. The first approach centered on the sobering fact that increasing work injuries and deaths seem inevitably to accompany increasing employment, with untrained workers entering the workforce and the shifting of regular workers to changed procedures and activities. Implicit in this approach was an overriding concern for the safety of the tide of young workers entering the labor force at the rate of nearly 3 million each year, and a realization of the necessity for preplanning safeguards and safe practices covering the host of new operations, machines, processes, and materials born of the current scientific revolution.

The second approach arose from the undramatic but steady improvement in the job injury experience among manufacturing industries, and the concurrent rapid growth in the trade and service activities. Conference planners sought to answer the question: "With nearly 2 million disabling work injuries a year, where is the problem concentrated, and where should the greatest safety effort be directed?" Certainly, with 380,000 injuries occurring annually in manufacturing, relaxation of safety efforts in these industries would be unthinkable. However, with 80 percent of all job injuries occurring in *non-manufacturing* activities, should not a concerted safety effort be undertaken by and within this area of injury concentration? Answering this question affirmatively, the Conference planners broadened the scope of the 1962 sessions to focus the spotlight of emphasis upon major non-manufacturing segments of the economy including trade, agriculture, construction, service businesses and transportation. The Technical

Advisory Committee of volunteer experts was expanded to reflect this situation by the addition of representatives from these nonmanufacturing groups.

The Conference theme, "Safeguarding Human Worth," was proposed by Dr. Leon Brody of the Center for Safety Education of New York University. Its rationale is this: "During the early discussions of the Program Planning Committee it was readily recognized that an accident meant more than individual injury or economic cost. And so it was agreed that the cost of accidents could not truly be measured in simple terms of property, limb, or even life. Safety transcends these criteria; it poses a moral, a cultural, a political challenge. Inevitably, therefore, accident prevention, in our free society, becomes a matter of '*safeguarding human worth.*'"

The 1962 Conference sessions were keyed to this central theme. Some 3,500 leaders representing virtually every segment of American life assembled in Washington to take part in this voluntary, cooperative endeavor to analyze and make recommendations concerning the Nation's needs in "Safeguarding Human Worth" through accident prevention.

From its inception in 1948, the President's Conference has consistently sought to underscore the national interest, and that of the Federal Government, in guarding the safety and health of American workers; to provide a climate conducive to unbiased examination and discussion of safety problems; to serve as a sounding board for the recommendations of the individual sessions and workshops; and to furnish technical assistance and information on the prevention of job accidents. Thus the Conference acts as a catalyst, fulfilling its mission through stimulation, education, and promotion—not through compulsion or legislation.

As the agency entrusted by presidential directive with responsibility for organizing and conducting this Conference, the United States Department of Labor expresses its appreciation to all who, untiringly and unselfishly, gave freely of their time, thought, and effort to help assure the success of the 1962 sessions. In particular, special appreciation is due to two men whose dedicated leadership, wise counsel, and active participation served as a model and an inspiration for all who took part, from the earliest planning stages to the final gavel that marked adjournment. They are the Conference Executive Director, Mr. Reed O. Hunt, President of Crown Zellerbach Corp., and Mr. Leo Teplow, Assistant Vice President of the American Iron and Steel Institute, who served as Chairman of a representative advisory committee in developing the Conference program.

The Vice President, the Honorable Lyndon B. Johnson, summarized the Nation's safety problem when he told delegates at the opening session, "Now we are in a new phase—opened up by the discovery of atomic energy. Our technology has reached a level where, if we cannot do things safely, we cannot do them at all . . . This Nation's vital quests for information cannot be permitted to fail—and cannot succeed without safety . . . It is very heartening to have your help in this life-saving task."

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Part I

Opening Session



Vice President Lyndon B. Johnson Addresses the Opening Session

The President's Conference on Occupational Safety

THE PRESIDENT'S CONFERENCE ON OCCUPATIONAL SAFETY was convened in a 3-day session on the morning of March 6, 1962, in Constitution Hall, Washington. The Honorable Arthur J. Goldberg, Secretary of Labor, presided as chairman of this, the eighth biennial Conference session.

The Invocation was offered by Brig. Gen. William J. Moran, USA, Deputy Chief of Chaplains, Department of the Army.

In welcoming the delegates to the Conference, Secretary Goldberg read the following message from the President of the United States:

THE WHITE HOUSE
Washington

March 6, 1962.

Last year 13,500 workers were killed on the job and another 1,930,000 received disabling injuries. This is a tragic record in terms of human suffering and economic loss.

We must all do more to reduce on-the-job accidents and make our work places safer.

Toward this end, you who are today meeting as part of the President's Conference on Occupational Safety can make a constructive and significant contribution by pooling your knowledge and efforts to cut down job accidents.

In this work, I wish you every success.

I urge every citizen to accept part of the responsibility for preventing the needless suffering and loss of life caused by accidents by practicing safety on and off the job.

You have my best wishes for a successful meeting and my sincere thanks for taking the time to attend this conference.

Sincerely,
JOHN F. KENNEDY

Safeguarding Human Worth

The Honorable ARTHUR J. GOLDBERG, Secretary of Labor

It is a great pleasure for me to welcome you to this 1962 President's Conference on Occupational Safety.

Your presence today, gathered together as you are in common purpose, is the type of cooperative effort to meet national needs that distinguishes a democratic society. You are here today, not because you were told to be, but because you wanted to help your country.

This is a great example of voluntary cooperation by labor and management and government and public representatives—all acting together to solve a common problem.

When it comes to safety, talk is not cheap—it is vital. During this Conference, you will listen to others; you will talk together; you will talk to others; and when you return to your own communities, the talk will continue. The safety message flows on this current, and when it results in a heightened awareness, a new consciousness of his own responsibility in the mind of every working person—then progress results.

I think you are entitled to some satisfaction as you look back at the achievements made in this area; I think we all have cause for concern as we look forward.

As I look back myself, I recall very vividly the great good luck I had—although I was not aware of it at the time—of surviving with two arms intact after working for some time in a furniture factory, feeding large boards into a great saw, unprotected by any device such as we know today. There were many who did not have that luck.

But we have made a great deal of progress in the decades that have passed since I held down that particular job in Chicago. We can probably say that we Americans have too often a tendency to denigrate our country when we talk about our problems. We can probably say that American industry, thanks to efforts such as this Conference and others like it, is the safest in the world today. But because ours is a free country that does not conceal or hide its problems but regards problems really as challenges and opportunities, we can also say that we are not satisfied with the kind of records that we have in this safety area. We want to do better because there are still, as the President has indicated in his message, formidable totals of death and disabling accidents in the country.

Recently, we had two illustrations of the virtues and also the problems involved in safety. We put our astronaut into space and we did it after an agonizing period of delay. And during those weeks of

painstaking efforts to make certain that the shot was as safe as human ingenuity could make it—I am sure that all of us shared a sense of frustration. But look at the dividends that we realized as a result of those safety precautions taken for Colonel Glenn. And I think the Space Administration and all that great team of workers, contractors, employers, scientists, government personnel—are all to be congratulated on having the fortitude to delay that shot until they had taken every human assurance to make sure that one man, that great, heroic man, was safe as they could make him be.

Now last week we had another incident. We don't know the cause of it, but all of us must reflect that that airline accident, which happened at Idlewild with the loss of 95 lives, is a matter of great concern to all of the American people, and we are all participating—government, the industry, the unions involved—in the study of that accident so as to make sure that all steps have been taken or in the future will be taken to avoid such accidents.

We all felt, I am sure, the two elements of tragedy in that event—pity and terror.

But how many people, I wonder, stopped to ask themselves about the continuing tragedy of occupational accidents that last year killed 13,500 men and women and maimed almost 2 million others?

Suppose that the newspapers of this country headlined each and every working day of the year—"55 people die in accidents." The mounting toll would arouse the attention and concern of the American people. Yet that is what is happening, without the headlines.

You are all aware of this. That is what brings you here today. But there is a deeper significance to this Conference than the pragmatic response to an evident calamity.

Are you really here because the death toll stands at a certain level? Are you here only because the economy is taking a 170 million man-days' loss each year through accidents? Are you here to help retrieve some of the \$4½ billion that occupational accidents cost the Nation year in and year out?

I don't think so. What brings you here is implied in the Conference theme—"Safeguarding Human Worth." Because man is what he is—a creature of total worth that is incalculable in terms of either time, place or station—a single death through accident is one too many.

There is no substitute for a perfect record in the safety field. Our goal is the perfect record—because nothing short of that equates in any way with the value we place on the human being.

So you are summoned here to perfection.

Nor is it an unattainable goal. When safety education, safety re-

search, and safety engineering are stressed, the barometer of accidents falls quickly. Our experience in industry and in government, especially in programs like those of the Atomic Energy Commission and the National Aeronautics and Space Administration, bears this out quite plainly.

Accidents do not happen where the work is most dangerous; they happen where they are permitted to happen.

Good safety records are posted in the face of the greatest hazards because people talk and think and act on safety.

Many years ago, when people in every walk of life became alarmed about the toll of occupational accidents, our economy was characterized by dangerous conditions at the manufacturing work places. Today, those conditions have vastly improved. The employment accident today is no longer in manufacturing; there has been a shift in the labor force toward white collar jobs and toward trade and service jobs. We are now the only nation in the world with more white collar workers than blue collar workers.

The safety challenge has enlarged along with this trend. I was very much surprised when I found that 80 percent of work injuries now occur in nonmanufacturing occupations.

Injury frequency rates in wholesale and retail trade, for example, not regarded as a particularly dangerous place to work, are outrunning those in manufacturing, and have for several years.

The job expansion fields are also the injury expansion fields. This is a clear and present danger.

A huge part of our industrial accidents are automobile accidents in the course of work. Here the Federal Government is heavily involved. The largest single cause of deaths in the Federal service—omitting catastrophes—is the motor vehicle.

I want to compliment the States because they have improved, under the fine leadership of our Bureau of Labor Standards, their safety requirements, and the wide variations which used to exist have largely been eliminated.

Now you will be talking about all of these things—the safety problems of the trade and service industries, the accident problems of construction and transportation, farm hazards, and the safety situation in the public service, where roughly 8 million people are employed.

I would like to suggest to you this morning what I indicated at the beginning of this welcome: No one can do this job alone. I have talked in the past about the separate but interdependent responsibilities our people bear for the solution of problems like unemployment.

It is no less true for safety.

Here the great partners of American industrial life—labor, manage-

ment, the government, and the private citizen—must each bear a distinct part of the responsibility. Together, they can eliminate the problem.

I would like to say a word to the labor union representatives who are here. You have a special obligation in this area, because from the outset of the great trade union movement in the country, safety conditions have been a matter of prime concern to labor unions. You have access to a great membership, and you have a responsibility to use these channels of communication, to use this voice to place the safety message through your channels to your members so that every member of every union knows that safety must become a habit, day in and day out.

Secondly, our great companies—many of which are represented here today—are familiar, I am sure, with the adage that reads: "Safety begins at the top, or not at all." One can almost predict the safety record of any business by the extent of safety awareness in its management, from the top down.

The distinguished Executive Director of the Conference, Mr. Reed O. Hunt, President of Crown Zellerbach, symbolizes what most of the important executives of American industry know. His industry is an industry of great possible complexity in the safety area, and yet as his participation in this Conference and leadership of it demonstrates, he has known the significance of the slogan that "Safety begins at the top," and it reflects in the exemplary safety record of the Crown Zellerbach Corporation. So, just as I have appealed to the labor people to be missionaries in the safety area, so I appeal to the top management that you be missionaries, too, because where you lead your colleagues will follow.

As for the public service, President Truman, in 1945, set the keynote for the Federal level: "The Federal Government should lead, not lag, in the important field of employee safety." President Kennedy has remarked: "It is the policy of the Federal Government to safeguard from injury all those who work for it."

The public service program has been given a boost by the Civil Defense effort which not only makes safety everybody's business in a personal sense but also calls upon government at every level to plan and to educate our citizens for the better handling of everyday hazards as well as disaster contingencies.

And finally, the private citizen—the "do-it-yourself" fellow, the Sunday driver, the weekend fisherman—can learn to make a better habit of safety at work and at home. Education for safety begins in the home; the habit is formed there. All of us, I think, can do a better job than we have done in the past of including safety when we counsel our young people, especially as they enter the world of work.

In concluding let me again thank you for attending this important meeting dedicated as it is to the protection of the individual.

There are so many people I would like to thank, I cannot mention them all. But I want in particular to renew my thanks to Mr. Hunt, to Mr. Teplow, to Mr. Motley, the Director of the Bureau of Labor Standards, Mr. Brown, the Deputy Director, Assistant Secretary Reynolds, to all the participants in the sessions, to our Advisory Committee for its great contribution to the success of the Conference. And, of course, I want to thank very much our band master and the fine band that is with us and all of those who are contributing so much to the success of this most important meeting.

We want to emphasize here, through deliberations, that we are focusing our attention, as I said at the outset, on the individual as a creature of God with a Divine Spirit, not as a mere statistic, for this is the hallmark of our society, and the strength of our democratic system.

With the interest you are displaying by your presence here, with the dedication, with the will to serve, I am confident that, just as we have made notable achievements in the past, we will continue in the service of our fellow man by promoting and forwarding the cause of his safety, his well-being, upon which he and his family so much depend. Thank you very much.

Address by The Vice President of the United States

The Honorable LYNDON B. JOHNSON

The President, Secretary of Labor Goldberg—all of us—are personally grateful to you for taking your time and trouble to come here. And if you ever doubt how worthwhile it is, a look at the scoreboard should be convincing.

President Truman started this conference in 1948. The year before, 17,000 men and women died in on-the-job accidents—17,000 lives lost.

Thanks to your efforts, that figure of 17,000 has been cut by 3,500 as of last year—although employment has constantly been rising.

Permanent disabilities in the same period have been cut 10,000; temporary disabilities by 150,000.

Now, I think this is great progress and I think it illustrates—with human lives—how much can be done.

There was a time when safety on the job was a concern of just a few humanitarians, so-called “do-gooders” as they were disparagingly called. Then came the hard-boiled dollars-and-cents engineers who placed the problem on a profit-and-loss basis.

Now we are in a new phase—opened up by the discovery of atomic energy. Our technology has reached a level where, if we cannot do things safely, we cannot do them at all.

To put it specifically, if we cannot split or fuse the atom safely, we cannot split or fuse the atom at all.

Our great efforts last week in space dramatize the point.

Every person in this country must be aware of the meticulous efforts to get the astronauts and their capsules up and down safely. Some 1,200,000 different tests were made to assure that Commander Shepard would be brought back alive. Colonel Glenn's safety was considered so important that orbit was repeatedly delayed, time and time again, until every possible bug that could be envisioned was cleared up.

When John Glenn circled the earth, he did not ride alone; 180 million Americans rode with him. And he carried the hopes and the efforts, the checks and double-checks of thousands of scientists, technicians, workers, and safety experts. The result was a safe and successful triumph of knowledge for the Free World.

Now, this Nation's vital quests for information cannot be permitted to fail—and cannot succeed without safety.

What we learn on these voyages of discovery is quickly adapted and it is already being applied in industry.

You who have done so much in establishing safeguards in work places of this Nation understand better than anyone else that new hazards are born of scientific revolution. So if our ingenuity can achieve this progress, I am confident that the ingenuity which is represented here this morning can apply new knowledge to wipe out old hazards as well as the new ones.

It is very heartening to have your help in this lifesaving task.

You live in a century of challenge. You live in a century of dynamic opportunity. You live in a frightening time, when no one knows what tomorrow may bring. But you are courageous people, descendants of people who had great imagination, ingenuity, and great courage. And you are not frightened by the problems; you just want to find the answers.

I am happy I could come here. I tell you earnestly I have never known a government that is more concerned with humanity, more anxious to do something to preserve human lives, to make living more enjoyable, more dedicated to leaving this a better world than we found it. And all of us are conscious that our ancestors did pretty well by us. They gave us a good system. They gave us an opportunity to try to make the most of it. But we shall fail those who look to us and who have faith and confidence in us if we don't constantly plug forward to make this a better world than the one we found. Then, in

the decades to come our children will be proud to look at the developments in the first part of the 20th Century and glad to say of us: "They achieved real results. They contributed something to their fellow workers. They made life better for others. They believed in humanity." And the feeling that you have had a part in that achievement will give you a satisfaction that you don't get in a little pay raise in your pocketbook. That can be spent at any supermarket. The real satisfaction comes in knowing that you have made life worthwhile to others, that you have set a good example, that you have provided leadership, that you are part of a program that has made this a better world.

Part II

Safeguarding Human Worth: For Tomorrow's Living



Speakers at session on "Safeguarding Human Worth: for Tomorrow's Living Today," Tuesday afternoon, March 6. Project Mercury Astronaut Maj. Leroy G. Cooper, USAF; Dr. Hugh L. Dryden, Deputy Administrator, National Aeronautics and Space Administration; Reed O. Hunt, President, Crown Zellerbach Corp., and Conference Executive Director; Leo Teplow, Assistant Vice President, American Iron and Steel Institute, and Conference Program Chairman; Eugene J. McNeely, President, American Telephone & Telegraph Co.

SAFEGUARDING HUMAN WORTH: FOR TOMORROW'S LIVING TODAY

A symposium under the chairmanship of Reed O. Hunt, Executive Director, President's Conference on Occupational Safety; President, Crown Zellerbach Corp.

MR. HUNT. This morning Vice President Johnson and Secretary Goldberg laid before you the fundamental challenge of this Conference—the vital need to safeguard human worth in the face of our rapidly changing technology, as well as in our nonmanufacturing industries, where the great majority of today's work injuries occur.

This afternoon we will be concentrating our attention on the first of these two hazardous areas of our national life by probing into some of the serious problems in human safety raised by the various scientific and technological advances to which we are committed, indeed dedicated, in an indefinite future. In the vast acceleration of scientific progress during the past 15 or 20 years, two great breakthroughs among many others stand out—nuclear fission on the one hand, and on the other, the first exploration of outer space. Both of these tremendous achievements have depended from the beginning upon our ability to anticipate and plan for the safety factors involved. Yet, if neither of these developments could be achieved safely, they could not be achieved at all. What we have learned from all this experimentation is the importance of preplanning safety, of anticipating dangers ahead, of using safety technology, if we will, to run interference for the future. In the words of our topic this afternoon—to safeguard human worth we must plan for tomorrow's living.

In the exploration of space we have perhaps the most dramatic illustration of our concern for human safety and our ability to create a shield to protect the individual astronaut in the hostile environment in which he must function. That shield, as we know, is composed of many different parts and goes far beyond the capsule itself and the systems it contains. It is made up of advanced planning, of countless checks, tests, and dress rehearsals. It includes thousands of people on the ground, tracking stations around the world, and instruments of enormous complexity.

I feel certain that Commander Shepard would agree with us if we said that his flight, the flight of Captain Grissom, and Colonel Glenn's

three orbits around the globe 2 weeks ago drew upon the safety lessons of many years past. What construction men had learned about safety went into the building of the test and launch sites. What had been learned about controlling highly volatile chemicals went into the booster that launched the astronaut out of the earth's atmosphere. We know, too, that space exploration has become a major industrial activity in the United States involving some 5,000 companies with safety problems unique to this development in our economy. All of this is a measure of the effort we are making toward the conquest of space while safeguarding each individual who is participating in the outer frontier of science and technology. We are very fortunate this afternoon, and I have the honor to introduce the first participant in this unscheduled event on your program. This man epitomizes in his person the concept of advance safety research and planning—of the teamwork essential in furthering the pursuit of knowledge in our scientific age.

As a distinguished scientist, he has been interested in space exploration a lot longer than most of us. During World War II he served on numerous technical groups concerned with aeronautics and guided missiles on behalf of the Joint Chiefs of Staff, the military services, and the National Advisory Committee for Aeronautics.

After the war he became director of research for NACA and finally director. When the National Aeronautics and Space Administration was created, he became its Deputy Director. He is a member of, and advisor to, many scientific committees counselling this Government, the UN, and NATO. He is active in many scientific associations and holds seven honorary degrees in addition to those he acquired from Johns Hopkins University.

He has exercised overall scientific control of this Nation's space effort.

He will give us his views on the topic "Safety Goes Into Orbit." And he has brought a friend whom he will introduce. It is an honor and privilege to present to you Dr. Hugh Dryden, Deputy Administrator of NASA.

Safety Goes Into Orbit

DR. HUGH L. DRYDEN, *Deputy Administrator, National Aeronautics and Space Administration*

Two weeks ago today the United States sent a manned spacecraft on three orbital trips around the earth and brought it back—safely—within a predetermined recovery area. In doing this, America not

only advanced her program for peaceful exploration of space, but also demonstrated to the world our great concern for human values, woven so intimately into the fabric of our national culture, that distinguishes ours from certain other ideologies and political systems.

When Colonel Glenn's Friendship 7 spacecraft roared skyward from launch pad 14 at Cape Canaveral, he was not—as he later told the Congress—alone. There were with him then the hopes and prayers of millions of people throughout the free world. But he carried something more. Riding with him in his crowded capsule was a priceless companion—a safety concentrate—distilled from all the safety knowledge we have accumulated over the years—safety know-how drawn from experience in virtually every area of human endeavor. Unremitting, uncompromising pre-planning, pre-testing, checking and re-checking for safety is essential at every step in the intricate complex of activities needed to launch a space vehicle and bring its spacecraft back to earth. Figuratively speaking, Colonel Glenn's historic flight was the apex of a pyramid of effort spanning some 31½ years, which involved the most painstaking tests of every component in the Mercury capsule and its control, communications, and life support systems. Tests of the rockets for boosting the capsule into orbit; tests of the globe-girdling network of ground support facilities necessary for tracking the spacecraft's 5-mile-per-second flight, for monitoring the pilot's physical condition and performance, for maintaining radio telecommunication and control.

And safety awaited Colonel Glenn's return to the earth, aboard the ships and aircraft patrolling the recovery area—in the minds and hearts of the men whose job it was to retrieve the capsule if possible, but above all, to bring the astronaut back to dry land—safe and sound.

As incredible as it may seem, no less than a million and a quarter tests were made to qualify the components of the Project Mercury system as spaceworthy. Indeed, the entire project may be likened to a carefully conceived safety program executed on a vast scale.

Many of these tests that helped assure the success of our first manned orbital flight reflect NASA's overall safety program, which is being continually carried out in every area of science and technology and is an integral part of all our numerous, varied, and widespread activities.

In calling this Conference 10 months ago, President Kennedy said: "Although the rapid pace of scientific and technological advance has minimized certain risks . . . it has also added new hazards to the old ones which are tragically familiar to us all. Such advance must not be made with unnecessary sacrifice of human life and limb. . . . Regardless of the scope of modern research and development, safety is the primary purpose and most important product of today's scientist.

This is a lesson I hope the Conference will inspire us all to learn and apply wherever people work or employ others."

As you know, NASA has a unique role as a research and development agency pioneering in the fields of aeronautics and space exploration. We have had to develop entirely new safety techniques and rules to govern performance of work that is often not only extremely hazardous but has never been done before.

The atomic scientists who first achieved nuclear fission nearly two decades ago well knew that if a chain reaction could not be carried out safely it could not be accomplished at all. Much of our work at NASA is in the same category.

Some months ago, in response to a newsman's query about accelerating our man-in-space program, President Kennedy replied: "We are very concerned that we do not put a man in space in order to gain some additional prestige, and have a man take a disproportionate risk, so we are going to be extremely careful in our work and, even if we should come in second in putting a man in space, I will still be satisfied if when we put a man in space his chances of survival are as high as I think that they must be."

It is this regard for human life and safety that characterizes all of our activities at NASA. We are concerned—justifiably so—with the safety, even comfort, of the astronaut. But we are concerned, too, and with equal justification, for the safety and well-being of every one of our 19,000 employees, many of whom operate our far-flung network of tracking and data facilities, work in our laboratories and test sites, and perform the myriad duties involved in readying and servicing our space vehicles and their related equipment.

NASA's safety policy is designed not only to safeguard its own personnel and facilities; it goes beyond this, seeking to eliminate hazards to all persons and property near NASA installations or in the path of space and aeronautical experiments.

As we undertake more advanced space exploration projects—and we must undertake them—we shall inevitably encounter new hazards, risks as yet unforeseen. We must anticipate and guard against these new dangers. We must continue to pre-plan and pre-test, step-by-step, as we push ever outward into the cosmos. To this task we shall devote our best efforts.

At the same time, it must be recognized that this new field of endeavor is not only uncharted, but inherently hazardous. Alan Shepard returned from a ballistic flight at the suborbital speed of 15,000 miles per hour. John Glenn was recovered safely from an orbital speed of over 17,000 miles per hour. Within a few years we will be attempting to recover men who approach the earth at nearly the equivalent of escape velocity—25,000 miles per hour, or 7 miles

per second. This is not a problem to be approached lightly. The safety systems are of great complexity, and man is incapable of 100 percent reliability in the development of such systems. This is why we are doubly cautious in our approach to manned space flight.

From the beginning, we have stressed the inescapable fact that successful space exploration is a team effort, a cross-section of highly coordinated endeavor, welding many individuals and many different disciplines into a smoothly functioning organization for achieving a common objective. This team concept extends all the way from the "Freedom Seven"—our first team of astronauts—to the small group of electronics and telemetry experts manning one of the tracking stations in a remote spot halfway around the world. And it extends beyond NASA itself. It exists among the thousands of people—the contractors and subcontractors and their employees, the many elements, civilian, civil service, and military—who are combining and blending their efforts with ours to advance safe navigation of the boundless "new ocean" to which the President recently referred.

Our exploration of space is not an end in itself. Its results will profoundly affect mankind for generations yet unborn—in ways no man today can predict with certainty. In fact, the impact of the Space Age upon our lives has already begun to make itself felt. Space research has developed new materials—metals, alloys, ceramics, fabrics, plastics, chemicals—many of which are already in commercial production. In some cases the new materials create new accident or health hazards. As the production and use of certain of these new, exotic, materials become more widespread, it is inevitable that more and more people will be exposed to new risks—some as yet unknown—associated with making, transporting, and using these substances. Therefore, the safety lessons we have learned, and hopefully will continue to learn, in our research and development work—in the ever-widening orbits of space flights—must be grasped and taught to an increasingly larger number of employers, employees, and even ultimate consumers. I hardly need point out to this audience the tremendous safety challenge that these developments—and those to come—represent. For it is only through their *safe* use that the end products of scientific research can bring to mankind the full benefits which they are capable of bestowing.

Dr. Dryden's Introduction of Major Cooper

And now I know you would not want to listen to me talk generalities for a long time, and so I have brought along with me a visitor who makes the safety of manned space flights more pointed and more in-

teresting to you. He is one of the astronauts, Maj. Leroy G. Cooper. Born in Shawnee, Okla., I find he was in several of the Services. He entered the Marine Corps in 1945, attended the Naval Academy Preparatory School for some months; he attended the University of Hawaii, received a commission from the Army, transferred to the Air Force, and, of course, he is now in the U.S. Air Force.

Without going through all of this account of his life, like most of the astronauts—I think all of the astronauts—he has been trained as an aeronautical engineer. The astronauts are an essential part of the whole design and developmental part of the program, as well as the flying. His assignment has been safety and that is the reason we brought him here today, to speak to you on safety in connection with manned space flight.

Presentation of Birthday Cake by a representative of Bakery and Confectionery Workers' International Union of America who said: "I want to interrupt this program for just a moment to make a surprise presentation. Major Cooper, on behalf of your many friends in our organization and the citizens of this country, we now wish you a very happy birthday."

Safety Measures in Project Mercury

ASTRONAUT LEROY G. COOPER, *Major, U.S. Air Force*

I would like to touch primarily on about three areas, on more specifics than generalities.

Before we get into orbit, there is a lot of groundwork to be done. Prior to all the initial ground safety, we have the concepts of launching the vehicle, launching the spacecraft, and then of safety in orbit, throughout the flight, and in recovery.

I will touch very briefly on specifics in these fields.

First of all, in ground safety, I am sure that a lot of you are more familiar with the various ground safety aspects involved than I am. However, over the past few years, I have had to learn pretty rapidly these various ground safety aspects in dealing with chemicals and ordnance.

Now, we take the usual amount of precautions in chemicals, and by chemicals I am referring to hydrogen peroxides, liquid oxygens, and so forth.

In the ordnance field, we have had to devise new safety methods in some cases because some of the old safety concepts did not take into account inserting a man directly in with these ordnance items and dealing with them under the various conditions in which we are apt to deal with them.



A Birthday Cake for the Astronaut. Maj. Leroy Gordon Cooper receives a Surprise Birthday Cake From Bakery and Confectionery Workers' Union.

So, much of this testing had to be done in these foreign elements and in the foreign environments in which ordnance heretofore had never been utilized.

So, in the ordnance items, we go into the aspects as far as arming the squibs, of having squibs that are inserted into these systems which could be removed for the general handling, where there is no radio frequency interference when these systems are armed, and maintaining

utmost discipline on this so there is no possibility of triggering these devices from an outside source. It includes special blast reflectors to protect crews who have to work around the armed ordnance after it has been armed and maintaining the usual precautions of as few personnel in the area as possible and completely eliminating personnel in the area at times when you have the greatest criticality.

Now, we move into launch safety concepts, and even more new methods have had to be devised with the concept of inserting man into the system. First of all, we take the normal launch procedures and after we have gone through the normal ground safety procedures, evacuated all the people from the area except those under blast shelter. By "blast shelter," I mean within a block house area or within an armored personnel carrier capable of withstanding over-pressures. We have eliminated the source, then, of harming a person except the astronaut who is sitting on top of a considerably large ordnance. For him we have an escape tower capable of being fired from the spacecraft, from the block house, or from an automatic triggering device which senses certain critical items.

Now, this escape tower will carry the spacecraft approximately 2,500 feet in the air and approximately 5,000 feet in horizontal distance from the launch pad. In the event of a booster malfunction or an approaching catastrophic event in the booster, the spacecraft would be aborted off the booster and taken well into the air and well clear of the pad.

So we have all personnel, then, considered for the normal launch or for the emergency involving a booster blowup on the pad. But then we get into emergency conditions where, due to some short circuit, due to fire in the tail area where you might burn out wires, due to internal cockpit problems, hydrogen peroxide leakage, or things of this type, fumes in the cockpit, fire in the cockpit, perhaps you could not use the escape system. In this case we have to put in a pad rescue squad to remove the astronaut or to assist him in removing himself.

Now, in this line we have spent many, many thousands of man-hours and many, many thousands of dollars in developing new equipment, improving old equipment, and wherever possible giving any man subjected to these hazards the least amount of man-time hazard hours involved.

The crews that we put in in these conditions go in in what we call an M-113 armored personnel carrier, which is a 40-ton full track tank vehicle capable of floating in water, capable of very high temperature and over-pressures.

This crew will go into what we call our egress tower, either assist or directly remove the astronaut, load him into this vehicle and remove him from this hazardous area.

We have remote, very high flow, fire nozzles which can be controlled from the block house area. These can be radio controlled or directed by radio from the armored personnel carrier; two of the three armored personnel carriers have dry chemical fire-fighting systems on board which are proving quite successful and can concentrate fire power in the immediate area.

Then to back these up, we have the normal crash fire type equipment on 11-B fire trucks and fire tankers.

Then as I stated before, in order to get to the astronaut, we have what we call our egress tower, which has a drawbridge type platform which drops very rapidly in place and a rapid elevator to take him to the bottom to be met by the armored personnel carrier.

In the event of malfunction of this egress tower, we have what we call our cherry-picker, which some of you may have seen working on some of the tall street lights around the cities. It is a double-armed vehicle on the back of a large truck. Ours are considerably larger than those, with a little cab on top. It can be controlled either from the cab or from the ground. In the event of complete power failure or multiple failures, this can be used to remove the astronaut.

And then, since we like not to think that we have gotten into these emergencies, when we have had a normal launch and the launching goes off successfully, we get into the flight safety regime. This is a complete story within itself. I will abbreviate it and say that we have this escape tower which is good up to staging, where the booster engines are shut down and dropped off.

Now, any time there is a booster malfunction or any time the booster must be destroyed for any reason, the spacecraft is separated. There is a time interval before anything else happens so far as booster destruction. So under any conditions, from on the pad throughout the flight regime until the spacecraft is normally separated from the booster, it can be separated and go on its way through either a normal ballistic flight or an abortive type flight back to the landing sequence.

For the cockpit, we have cockpit purging. You are capable as a pilot of purging the cockpit of any noxious fumes or of actually extinguishing any fire you should have in the cockpit. Once you get to high altitude, you can depressurize the cockpit. There is no oxygen atmosphere available and fire and fumes can be purged from the cockpit.

We have dual hydrogen peroxide systems for flight control, each of which is separate, each of which can be shut off in several different ways.

We have multiple electrical circuits, each of which can be isolated and controlled and diverted into the primary functions.

We have dual environmental systems, each of which is capable of sustaining life under all the conditions of the flight.

We have the suit circuit and we have the cockpit or cabin circuit. Each of these is quite an elaborate system of maintaining a 100 per cent oxygen atmosphere.

We have the pilot over-ride on all the flight systems. The pilot has the capability of turning on or off any of the flight systems, of over-riding any of the automatic systems or going to manual or other automatic systems.

We have dual ordnance and dual ordnance admission systems.

As for the rockets—posigrade rockets, retrograde rockets—these are all highly reliable systems, highly simple, reliable, tested under all the various conditions which they encounter.

Then as we get down to the completion of the flight mission, which I have abbreviated tremendously, of course, we get into the dual landing systems, complete dual system of parachutes and of the pilot being able to back each one of these up by several methods and each one capable of safely landing a spacecraft in the water or on the land.

And then finally, since the flight is over, safely over, and we are in the water or on the land as the case may be, we have recovery systems which are not only dual but are actually multiple. A recovery team is capable of coming in and spotting it either on land or water, visually, electronically, and practically any other means you can think of that can fit into these various schemes.

This, then, has been a brief resume of flight safety.

I would like to say that every effort along the way has been keyed to going to utmost extremes to take care of not only the astronaut but all the people who are involved in the launching and the preflight, throughout the flight and throughout all the recovery, to see that every possible precaution is taken to reduce the chances of not only fatalities, but any minor injuries to people.

On-the-Job Civil Defense

The Honorable STEUART L. PITTMAN, Assistant Secretary of Defense for Civil Defense

The theme of your conference, Safeguarding Human Worth, expresses very well the essential purpose of the President's civil defense program. Nuclear attack poses hazards beyond the scope of any study of occupational safety. But some of the predictable effects of nuclear war can be mitigated by organization, planning, and preparation by those responsible for the safety of others.

Rapid movement in international and technological conditions have given civil defense a new meaning. This new meaning has not been fully digested. It is fair to say that it has caused a certain amount of indigestion at the present time. Civil defense is in a stage of transition, not only in program development, but in public attitudes. This transition will not be accomplished overnight.

Full appreciation of the blunt fact that our homes can be reached by a destructive force which we cannot control will continue to produce powerful and emotional reactions. These wide-ranging responses have recently focused on the shelter program. Differing conclusions on this subject are already shaking down to a more widely shared conception of what must be done when our country is confronted with the prospect of exposure to a destructive force for years, perhaps decades ahead. Our people and our leaders in America have always confronted danger with vigor and action when they understand it. Reasonable measures to contain, where possible, the devastations of nuclear war will be taken. The question is not whether, but how and when.

Prospects for doing something effective about civil defense, in the context of nuclear war, began on May 25, 1961, when the President of the United States established for the first time that measures to protect the American population are both possible and important, that they deserve a significant priority in the long list of the good things which we seek in America today. In July, he asked Congress for a supplemental civil defense appropriation which raised the level of Federal civil defense activity to four or five times that of earlier years. Congress responded to the President's leadership virtually without dissent. At the same time the President made the Secretary of Defense responsible for the civil defense program. Implicit in this move was recognition that civil defense is an integral part of national defense and important to the strength of the country. Thus the base was laid by August to take the necessary first steps.

Since transfer of the civil defense program to the Department of Defense last summer, the central task has been to define a realistic objective and sharply focus all activities on its attainment. The objective is doublebarreled: to locate and to stimulate the creation of enough fallout shelter space substantially to meet the full national requirement; and simultaneously, to bring about organization, planning, and training in every community in the country so that people will know how to go to shelter space, how to live in it, how to emerge, decontaminate, and survive in the hazardous first few weeks.

During the next year, the research program will generate a great deal of investigation into post-attack problems; into fire conditions

after nuclear attack; into the problems of lowering the cost of shelter construction designed to give protection against blast and heat; into bacteriological and chemical warfare defenses; into lesser known aspects of the effects of radiation and fallout.

We are well aware that more extensive planning for post-attack recovery at the national level and more adequate recovery planning assumptions for local use are vitally necessary to give more meaning to survival in the post-attack environment. Much of this is being done under the leadership of the Director of the Office of Emergency Planning. After we have put in motion the program necessary to develop a system of shelters and survival immediately after emerging from shelters, I anticipate that Federal, State, and local civil defense will be increasingly preoccupied with extending the scope of local community organization and planning to meet a wider range of post-attack problems and to assure that the period of survival develops into a period of recovery in the particular community. For the present, we have set this second phase of the problem aside until we can demonstrate that the first task of creating a national shelter capability is likely to be accomplished.

To accomplish the shelter part of this task through a program of Federal survey and incentives and technical assistance depends on the opportunity to bring into operation a large amount of shelter space throughout the United States at very much lower cost than is generally anticipated. Therefore, a major element in our shelter program is the development of low-cost methods of creating shelter space. Once the initial hurdle has been surmounted of creating a significant number of community shelters throughout the country, there will be grounds for confidence that the rest of the job will be accomplished. There will then be an adequate base of public understanding; there will be more widely available technical knowledge for those who control and manage buildings and new construction; there will be community demands for a complete solution to the problem of shelters to which all levels of government and private institutional life will be responsible.

We have reason to believe that a significant amount of shelter space will emerge from the shelter survey which is moving ahead of schedule, from the identification of opportunities to increase shelter space or bring it up to acceptable standards through minor modifications; through the application of design ingenuity to enable minor modifications in new construction to create low cost shelter space. Some of this will be financed under the shelter incentive program, if authorized by Congress, and some of it will be created without Federal funds.

You have heard about the shelter survey now in progress. We are taking inventory of all existing fallout shelter space for 50 or more people in existing structures. We estimate location of space for 50 million people.

This operation has been and continues to be a management problem of major proportions. First, it was necessary to establish facilities to train large numbers of architects and engineers through intensive 2-week courses in the complex geometry and physics of interaction between radiation and building materials and building shapes. The technology for this job was in the hands of a few dozen people in the country when we started. We have now given training in 2 military schools and 8 universities to approximately 2,000 professionals, of whom about 1,800 have passed the course. These men have returned to their architectural and engineering firms to spread the technology to others.

Approximately 600 architects and engineering firms are under contract to do this job throughout the country. About 10,000 employees of these firms will be used to analyze the structures, gather up the data, assist in locating the names and addresses of owners of buildings, and in marking the acceptable shelter space.

Many other sources of specialized skills and techniques were brought to this task. The Bureau of the Census has refined data-gathering methods over the years which have been applied to the survey. The census tracts were used as units to parcel out the survey work. The so-called FOSDIC forms developed by the Bureau of the Census have been adapted to simplify and automate the handling of the intricate and detailed information gathered on each structure. The basic information on these photo-sensitized forms are converted by the Bureau of the Census onto electronic computer tapes which then go to the Bureau of Standards for the machine computation and analysis. It is estimated that a professional engineer would take 2 hours to make the computations that are accomplished in less than 1 second for each building. Original sources of the data are the Sanborn maps developed by insurance companies, building codes, tax records, and zoning records, supplemented by on-the-spot investigation where necessary.

The result of the operation I have just described is to identify space believed to have a protection factor of 20 or better. The local government and civil defense organization has responsibility to obtain from the building owners, or their agents, the necessary permission to use the identified space for public shelter purposes. We have eliminated most of the practical difficulties which might have deterred private building owners from participating.

The architects and engineers, equipped with the computations on potential shelter space and the permission of the building owners, then make a thorough examination of the premises, marking such space as appears to meet our standards and developing cost estimates of minor improvements to increase capacity and bring substandard space up to the 100 protection factor which we have prescribed. The resulting plans and estimates are made available to the building owner who may or may not undertake the modification work.

We are running a test operation in 14 cities from which we expect to learn by mid-March what we need to know about the unpredictable practical problems in the operations I have described. We particularly need experience on which to work out precisely how to divide responsibility between the Federal Government and State and local governments. We have drawn the line by establishing a procedure which is now being tested. Early returns are encouraging. State and local governments and civil defense organizations are rising to the challenge of a difficult task, and one byproduct will surely be a rapid strengthening of civil defense organization as necessary to meet this complex and very concrete logistical undertaking.

The survey will be continued to pick new construction in years ahead. Many types of buildings create opportunities to build in shelter space at relatively low cost, in many instances at no cost or at a cost only in convenience or preference by building owners (for example, the location of windows and doors or rearrangement of structural design). Space for 50 or more people will be picked up in the continuation of the present survey activities and, with the building owner's permission, would be marked and stocked.

One of the many byproducts of the shelter survey is the early development of a systematic and uniform method of stocking shelters with the minimum supplies necessary to maintain the health and strength of a group of people in a community shelter. A good deal of research and testing went into the establishment of the requirements for food, water containers, medical kits, radiation meters.

Stocking as part of the survey operation will indirectly facilitate stocking of private group shelters or shelters for less than 50 people. Federal procurement of these supplies is being handled in a manner which will encourage manufacturers to make the same items available to the public at low cost. The Federal experience in this test operation will be made available in manuals to industry and other institutions which will have occasion to stock large shelters.

The new element in the President's civil defense program is the proposed grants to be made available to nonprofit institutions engaged in health, education, and welfare activities. The significance of this

step is not fully apparent in the \$450 million fund which has been requested for the next fiscal year to finance contributions toward fallout shelter construction by the eligible classes of institutions.

In the first place, this would be the first time that the Federal Government has participated in construction costs for shelter purposes, except under prototype or experimental programs. In deciding upon this course, the conclusion was reached that a nationwide system of shelters could not be developed without some Federal participation in the direct costs of shelter construction.

We believe that the combination of a significant amount of shelter space brought into operation under the survey, together with the stimulation of well-located community shelters in schools, hospitals, and similar institutions around the country, would make the problems of civil defense real and lay a base for coherent planning and development of integrated civil defense systems in communities throughout the United States. We have requested sufficient funds for fiscal year 1963 to provide incentive payments for community shelter space adequate to protect 20 million people. We are not predicting that these 20 million spaces will be in operation during the next fiscal year, but we anticipate the need to obligate funds in that amount. The shelter incentive program is conceived as a continuing operation for which appropriations would be requested in each of as many years as the requirement for shelter space of this type may continue.

We have projected a requirement of an average of slightly less than one-half billion dollars a year for 5 years to support the shelter incentive program, on the assumption that both subsidized and unsubsidized shelter space will by then have substantially covered the national shelter requirements.

It is our present intention to establish a uniform rate of incentive payment computed at \$25 per person sheltered, or cost, whichever is less. Except in unusual circumstances, 10 square feet will be allowed per person so that the contribution amounts to \$2.50 per square foot of acceptable shelter space. The incentive is designed to encourage ingenuity in lowering costs of shelter space and also to encourage the adaptation of space for other purposes such as classrooms, cafeterias, gymnasiums, storage rooms, to serve the secondary purpose of providing protection against fallout radiation.

The eligible institutions are, by and large, organizations that have relatively limited access to sources of financing. They are engaged in activities of a public service nature which in many instances are of a type supported by Federal programs. These institutions are well located in relation to population. Their buildings are occupied by school children, invalids, and others for whom society must take a

special responsibility. Thus, there is a logic to discrimination in favor of these institutions.

Some of the eligible institutions will have opportunities to create shelter space within the limits of the Federal grant. Others will have to find additional sources to make up the additional costs.

An inducement to unsubsidized shelter space is a continuing program of stocking and equipping shelter areas which can be open to the public in an emergency. Employees on the spot would presumably have first access to the shelter areas. The stocking by the Federal Government would supply 10,000 calories of a wheat-based survival ration and a quart of water a day for 2 weeks for each person sheltered. Medical kits and radiation detection equipment would be supplied.

As a byproduct of the national shelter survey, we have developed a capability for rapid, low-cost analysis of the shielding in existing buildings and in construction designs. We plan to offer this as a service to industry and other owners of buildings, using the highly systematized data gathering and machine computation processes of our survey. This will be done through qualified architects and engineers and will greatly reduce the cost to building owners of analyzing potential shelter space which they may suspect but not be sure about.

I want briefly to call attention to another element of our program to bring about a nationwide system of fallout shelters. It is hard to describe because it is intangible in nature. But in many instances, it will be more productive of shelter space than Federal funds. I refer to a combination of technical assistance, training and educational activities which are designed to disseminate the new technology of antiradiation construction to places where it counts. The courses for architects and engineers which I have described as a necessary first step in the shelter survey are being continued to meet a rising demand from architects and engineers not necessarily taking part in the survey. So this training is reaching out to architectural and engineering firms throughout the country, to engineers employed in industry, to architects and engineers on the payrolls of State and local governments.

Our effort to cross-fertilize technical knowledge in shelter construction is not confined to fallout radiation protection; we are actively cooperating with at least one architectural school in the development of construction techniques to meet the problems of blast and fire. We think that the involvement of professional schools in the problem of shelter construction is a major contribution to

assuring flexible and continuing adaptation of buildings in this country to the changing technology of war.

Since September, nearly 3,000 plans for buildings have been evaluated for shelter capacity and the comments and suggestions of our engineers have been made available. A series of professional guide manuals are in preparation and two have been issued. Some will cover blast and fire resistance designs. Others will focus on schools, hospitals, garages, apartments, and other specialized problems of antiradiation construction. A special effort is being, and will be, directed towards providing design and cost data to industry.

We anticipate that industry will account for a significant amount of new fallout shelter space. Some of it will be in office buildings and other high rise structures which require little modification. We are studying various types of plant designs in order to develop generalized plans to stimulate industrial interest in opportunities for low-cost shelter areas in plants. Government-owned plants will be used to develop prototype plans for typical construction.

Industry will have no hard money from the Federal Government to build shelters for employees. We will help in the intangible ways which I have described to cut down the costs to identify existing shelter space and thus make it easier to come to a decision on what to do in industrial and commercial buildings. But despite the absence of direct financing, we are calling on industry, and other elements of institutional life in the United States not covered by the shelter incentive program, to turn loose their energies and initiative, and some money, on the problem of constructing shelters in their buildings.

An entirely reasonable response to today's threat is a nationwide effort to make moderate adjustments in the buildings that protect us, and in the organization of community life. This means some reshaping of the design of institutional buildings; it means some low-cost simple shelters in peoples' homes; it means added responsibilities for police, firemen, local government, and civil defense organizations; it means new and added responsibilities on American management to organize and guide the people for whom management is responsible, and to exercise ingenuity on creating shelter space in industrial buildings at a low enough cost to be readily absorbed by the free enterprise system.

The Federal Government is proposing to spend about \$50 billion this year for defense; it is proposing to spend only about \$700 million for civil defense. Even though this amount dwarfs any previous civil defense efforts by the Federal Government, it does not put

measures of civilian protection at the top of the priority list. A realistic and effective civil defense program must be started now; this is clearly urgent. But your Government does not call on American management, labor, schools, or other elements of American life to divert major resources from important and useful objectives to a crash shelter program. The moderate Federal program provides a guide to business management in deciding what its responsibilities are, how much time it has to meet them and how seriously to take civil defense. Shelters can and should be incorporated in buildings in a way which will serve the useful peacetime purposes of the enterprise owning the buildings. Those who use space which doubles as shelters should decide how and where to create the necessary shielding and how much of their money to put into it.

But it is vital that American management and industry assume active responsibility at this time for developing plans for industrial preparedness. I suggest to you that priority in these plans must be given to saving lives in the event of a nuclear attack. Protection of plant property, of records for the continuation of the business, security against sabotage, planning for sources of materials, and essential production requirements after an attack—all of these are important subjects which have occupied the attention of American management. But it must be recognized now that carrying as many lives as possible through the first few weeks after an attack will be the critical high priority operation. Even looked at from the standpoint of continuation of a business enterprise, the people employed in that business, their lives, embody the great resource of a going concern. The knowledge, the ability to work together, the organization that has been built up by competent management and labor leadership has greater long run value and is harder to replace than the most valuable of physical assets.

A first task of American management concerned about industrial preparedness is to know your buildings. Know in detail what these buildings have to offer against radiation and what can be done to add to their protective features.

Protective business management can extend the Federal survey, which I have described, and discover what shielding, what cover, may exist or be improvised in their own buildings which does not qualify under the standards that are set by the Federal Government. This substandard space may make a very real contribution to saving lives during the period of several years when we are still trying to construct adequate shelter space throughout the Nation. Intensity of radiation would vary widely. No one knows where substandard space will save lives, just as no one knows where the blast and heat would make shelters useless.

Knowing where people can take cover in your buildings is the beginning. But it is only the beginning. It becomes necessary to plan for the utilization of this shielding. Who will use it? Who will train or be trained in shelter life, in radiation detection, in decontamination? I think in most instances American management is going to find that it can effectively prepare for employee survival only by working with the communities in which their buildings are located. A community solution is going to be necessary. Other space in the neighborhood may be needed by your people or you may have excess space, particularly under a nighttime attack. Coordination of shelter in a neighborhood requires the direction and supervision of local civil defense organizations.

In many places civil defense officials are either nonexistent or inadequately staffed. Community leaders sometimes sparked by alert industrial management and labor leaders must create and support effective civil defense organization. No institution or family can stand alone in preparing for the conditions which would follow an attack. It is my understanding that civil defense organizations in many communities have found that their greatest support is business management which has facilities and has managerial know-how which can contribute to the efforts of the community in which they are located to do something about civil defense.

The National Shelter Program will soon face American management with the question of whether or not to open buildings found to have adequate shelter areas for public shelter use in an emergency. Making your buildings available to the public in an emergency means fitting your shelter space into a community plan for using all present and projected shelter space. If no such plan exists, this is the occasion to start organizing one. At any time you can recover this space on ninety days' notice by withdrawing it as public shelter space, perhaps because you need it for storage or some business purpose which would make it unusable as a shelter.

Whatever your decision may be, tell your plant managers and building supervisors to expect to hear about the shelter survey, to cooperate and, if in doubt, to communicate promptly with someone in a position to make a decision. Weeks that we can't spare could be wasted by local managers unaware that top management is disposed to cooperate with its Government in finding an acceptable way to make space available for public shelters.

In conclusion, I wish to emphasize that an understanding of the proposed civil defense program and its acceptance by the American people in the coming year require widespread recognition that, while full security cannot be obtained from shelters, the chances of individ-

ual survival, and the percentage of total survival, can be greatly improved. As the shelter program is made real by its progress, public acceptance of this fact, and of its significance, will grow. This will make it possible to carry through with this program to its completion. This prospect is not likely to arouse much enthusiasm. It is an unappealing but essential task to all who must take part in it, and we all must.

Effective civil defense will eventually be with us because those many Americans who are willing to inform themselves, and think clearly about the problem, will feel an obligation to contribute their part to being very sure of the survival of their country. They will also have the satisfaction of having done what can be reasonably expected of them to improve the chances of their own survival and that of their community. There is little enough opportunity for Americans to participate actively and directly in the defensive strength of their country during peacetime. The President's civil defense program presents such an opportunity. To the skeptics, I suggest a look back at the history of the behavior of our people when given the opportunity by strong and far-sighted leadership to confront a potential threat to our country.

The Nation's Safety Corps—A Combined Task Force

EUGENE J. MCNEELY, *President, American Telephone & Telegraph Co.*

I am deeply honored to have the opportunity to talk to you today. I am sure that all of us here consider ourselves as members of the task force for the Nation's safety.

The safety battle is something like our international struggle—a protracted effort, a long-term struggle that requires the continuing endeavors of many knowledgeable and dedicated people to preserve our lives and values.

Our National Safety Record Is Not Good

As has been repeatedly pointed out by the National Safety Council, our national safety record isn't good. The casualty lists and loss records for 1961 are not yet complete. But preliminary figures show that accidents last year cost the Nation some 91,000 lives and nearly \$14 billion.

Only one national expenditure is greater than the cost of accidents—national defense. Accidents last year cost us more than the combined Federal 1961 budget of \$13.3 billion for labor and welfare,

commerce and housing, international expenses, natural resources, and the maintenance of general government.

In human misery, accidents cost more than we can comprehend.

But the cost of accidents must be faced and comprehended because we simply can't afford them. Our Nation, engaged as it is in the battle against Communist domination, needs every economic and human resource. To each of us as citizens falls a critical share of the responsibility for conserving these resources.

How are we doing in the discharge of that responsibility? Not good enough, I think you'll agree. We can be proud of past efforts and accomplishments. But the waste in lives and money continues to be more than the national purse and the national conscience can bear.

The Safety Challenge

Three things stand out that point up our need for new effort—perhaps new thinking—in the field of occupational safety:

First. The rate of improvement in occupational safety performance has slowed down during the last few years. The figures indicate we're operating on something of a plateau—and the plateau is too high.

In the late 20's, and throughout the 30's and 40's, significant improvements were made in both frequency and severity of injuries. From 1933 to 1956, for example, deaths from work accidents per 100,000 workers dropped from 37 to 23. But in the past 5-year period there has been no drop at all—we have stayed at the 22-23 rate.

Second. There isn't enough application of on-the-job safety learning to off-the-job living. Off-the-job injuries are 8 to 10 times as high as on the job. We've made some progress in making safety a way of work—but we haven't done nearly as well in making it a way of life.

In 1961, there was a fatal on-the-job accident every 38 minutes of the year. But off the job at *home* someone was killed every 19 minutes—just twice as frequently.

Yet wherever accidents happen they are prohibitively expensive—to the individual, to industry, to the Nation. And wherever they happen, those of us in industry must bear some of the responsibility as well as much of the cost.

Third. Accidents on the highways continue at record levels. Long before this year runs its course, more Americans will be killed and injured in motor vehicles than live here in the District of Columbia.

We have worked hard on this one in the Bell System. But specific

safe driving techniques used on the job aren't sufficiently carried over to off-the-job driving—we find our people have about 20 times more motor vehicle injuries off the job.

What Has Been Learned About Safety

I think it is valuable for us to stop now and then and look back at the distance we've come—not to feel comforted or self-satisfied but to be reassured that safety progress is really possible, and that accidents really are preventable.

I can speak best for my own business. Thirty years ago the operating telephone companies in the Bell System had an injury rate of 3.3 per million man-hours. Last year it was 0.68 per million man-hours, just about one-fifth.

In 1931 (31 years ago), we had 23 fatalities on the job—7.6 per 100,000 employees. Last year, with about double the number of employees, we had 7 fatalities—1.2 per 100,000 people.

In short, our fatality rate had been reduced almost 85 percent. Perhaps many of you have had this same experience in your own industry.

Progress of this kind is encouraging and I am sure that as new and complex devices have come into use, appropriate advance safety research and planning are being carried out. But there have been some disappointments too. Chief among these is the distressingly high incidence of driving accidents.

We have studied this problem carefully for many years and with mounting concern. I am convinced, in my business at least, that the critical factor is attitude—that most motor vehicle accidents occur because of utter disregard for safe driving habits with which the driver is thoroughly familiar. Our investigations bring this home to us almost without fail.

So it isn't merely a question of failure, but rather a matter of attitude and of applying what we have already learned.

I shall speak of attitude later. As a starter, let's see what we *have* learned.

First. Accidents are in nearly all cases preventable.

Second. In industry, accidents have been reduced by full acceptance of responsible leadership for the safety of the employee.

Third. Particular emphasis has been placed on the elimination of unsafe conditions, unsafe tools, and unsafe practices.

Fourth. The great majority of accidents are caused by unsafe practices—many of which in themselves seem insignificant.

Fifth. Elimination of unsafe practices will eliminate accidents.

Sixth. Elimination of unsafe practices is not costly—accidents are.

The question, then: What can we do to improve our safety performance?

Unsafe Practices

I have learned, as I'm sure many of you have, that I can visit a representative number of workmen in a given telephone organization—observe the unsafe practices and tell whether the accident rate of that force is high or low. The ratio of accidents to unsafe practices is fairly fixed. The law of averages does work—if you roll the dice enough times, you can foretell the number of sevens you will roll.

Then the question really is: What are unsafe practices and *how* do we go about eliminating them—on the part of ourselves, our employees, and our fellow citizens?

Let me illustrate unsafe practices from my own experience. Some 30 years ago, a man who worked for me fell from an extension ladder, crippling himself for life. Had he simply tied down the rope on the extension section, the accident would not have occurred. Here was an unsafe practice.

Another time, a workman threw a hand line over new wires being placed but forgot to tie the hand line down. The wires flipped up, hit a high tension line, and killed another man some distance away—a trivial, thoughtless failure that killed. Yes, another unsafe practice.

Again, a couple of years ago, at one of our major airports I saw a new jetliner crash, killing the four crew members checking it out. The investigation showed that the crash wasn't caused by failure of the many ingenious safety devices on the plane, but simply by someone forgetting to secure a movable pilot's chair. Another failure to observe safe practices.

I'm sure you can recall many such seemingly minor human failures that have crippled and killed. And I would guess that your reaction is like mine—a feeling of inadequacy and frustration that such small acts of carelessness go on and on in spite of our efforts.

But knowing the deadly nature of these small failures is important knowledge to us. It takes fine nets to catch small fish. But they can be caught. And so we construct finer safety nets out of the materials at hand:

- good training;
- full acceptance of responsibility for safety by each of us for himself and his fellow employees;
- safety-sensitive supervision and union leadership working together in a determined way to stop accidents.

Attitude as a Dominant Factor in Safety

But these are oft-repeated generalities. Do they have a common denominator? I think they do. I mentioned it earlier and it can be described by one single word—ATTITUDE. You tell me what the attitude of management, union officers, and employees is toward safety and I will tell you what their safety record will be.

We are all more inclined to worry about *conditions* than about *how people think*. Let me illustrate. People in the telephone business are exposed to all kinds of hazards—sleet storms, ice storms, hurricanes, fires, floods, and tornadoes. In restoring service after these catastrophes, they work long hours, use ladders both long and short under all kinds of conditions, drive icy roads, climb poles under dangerous conditions—work on plant which has in many cases been exposed and may still be exposed to hot electric wires. Now are these the times that our accident rates go up? Of course not. Our people recognize the hazards—they are careful at times like these—their attitude is one of carefulness—they work rapidly toward an objective, but cautiously.

Our accident rate goes up when our people are working on their regular day-to-day routine jobs—when they feel so safe they don't take the little precautions. Their attitude is: Nothing will happen to me—I can take a little chance. At times I am afraid that most of us are guilty of this to a greater or lesser extent.

What can we do about this *attitude*? This is where we, “the Nation's safety corps” must become a combined task force for safety. Is each of us—management, worker, union—carrying his share of creating a responsible attitude toward safety? Are management people blaming poor attitude on the union? Do we say we can't take appropriate disciplinary action for carelessness because it always results in a grievance? Do union officers and representatives blame all accidents on the tools and working conditions provided by management? If the attitude is right, we can find a way to convert the careless worker. It will undoubtedly take the combined effort of both union and management to do this.

One essential of right attitude, then, is—all of us working together looking for the unsafe practices.

National Safety Council President, Howard Pyle, points out that “we can get only so much safety as people want.”

The problems we face in safety relate both to our personal actions as individuals and to our actions as leaders of others.

These questions—like other national issues—do not admit of easy answers. If we knew a simple recipe for changing peoples' attitudes,

winning the cold war would be a simple process. In spite of all of our great scientific progress we still don't have any instant or easy way to change a man's attitude even though such change is clearly for his own good.

A Safety Platform

But we do know some steps that are helpful in changing attitudes. The political parties call these steps "platforms." And so I would like to suggest to you today a "safety platform."

The first plank involves each one of us as an individual.

Needless to say, what we do drowns out what we say. As safety professionals, we have all the safety duties and responsibilities of every man—plus the added responsibility of having our actions always weighed by others in light of our safety interest. With us, safety must be a full-time, deeply held conviction that is apparent in all of our actions. Our own *attitude* must be right.

The second plank relates to our work with others and is more a series of specific suggestions, based on what has seemed effective in producing individual involvement and responsibility in my company. I am sure many of you are doing these same things and perhaps more. At any rate, I want to offer the following suggestions for creating proper attitude.

- (1) Be on the alert at all times for unsafe practices, unsafe tools, or unsafe conditions. Attitude on the part of all employees in this respect is of greatest importance.
- (2) Use all known methods of establishing a proper attitude toward defensive driving.
- (3) Bring several people in on the investigation of all serious or potentially serious accidents. Frequently the investigation of an occurrence where an employee barely missed serious injury can be of great value in attitude formation.
- (4) Be on the alert for the "indifferent" employee. Bring him in on accident investigations.
- (5) Analyze the need for appropriate training and see that the training is carried out. In two recent major airline crashes it was reported that when the ground rescue parties arrived at the wrecked planes they did not know how to get the airplane doors open from the outside.
- (6) See that management at all levels accepts full responsibility for its employees and that the safety record of a supervisor is given weight in his promotion. If a supervisor really believes in *safety first* but he can't achieve it in his force, it isn't likely that he can be effective in other fields of his supervisory

effort. Since the union also has a responsibility to its members, the assistance of union officers in achieving proper attitude toward safety should be forthcoming.

- (7) Make safety attitude a factor in the general appraisal of an employee, just as for leadership, production, and cost consciousness. This has the effect of making both supervisor and employee more aware of the fact that a man's attitude towards safety says something about his feeling of responsibility.
- (8) Be as concerned about off-the-job accidents as those that occur at work. Publish statistics for both. Use on-the-job safety meeting time for telling the off-the-job story. Involve the employee's family in safety. After all, they have the most to lose when the breadwinner is hurt. We have used family nights and open houses to stress safety themes, and we mail some safety materials direct to the homes. From the playback we have received, we think these things help the safety attitude.
- (9) Stress the specific. Have supervisors and safety committees spend a few hours or a few days looking for just one type of accident hazard. I learned this approach the hard way many years ago. I found that if I went looking at ladders, for example, I found more potential accidents than if I just went looking in general.

The same sort of specific emphasis should be applied to the informational program. We are all adept at screening out vague posters, pamphlets, and propaganda messages of all kinds—the larger and fuzzier the concept, the easier to screen and discard.

- (10) Determine the underlying causes of each accident and take appropriate steps to prevent recurrence. Follow up on all reported hazards until they are cleared. Insist on good housekeeping on the job.

A Typical Task Force

How then, as a practical matter, can we keep these safety principles in the forefront, in view of the increasing complexity of most all business? The answer is that we must truly have a combined task force which includes everyone on the job. It must start functioning simultaneously with the conception and subsequent development of every new product, new service, new operating practice or procedure.

It must function likewise in connection with any proposed modification of any of these.

In our business we do our best to build safety into each tool or product at the very outset: by the Bell Telephone Laboratories in their research and development; by the Western Electric Co. in its manufacturing design and material specifications; by the American Company in its preparation of written practices and procedures used by our operating companies through the Bell System. Safety cannot be an afterthought. It must be a fundamental part of the basic concept.

Let me give you just one simple illustration: Most of you have probably seen a telephone lineman go up a pole with climbing irons strapped to his legs—"climbers," we call them. They have been used in the business since the beginning. One major cause of accidents when working on poles is "climber cut-outs," *i.e.*, when the lineman is climbing up or down a pole, one of his climbers suddenly cuts out of the side of the pole. This sudden loss of support may cause the lineman to slide down the pole and in some cases results in serious injury.

A few years ago we restudied climber cut-outs and came to the conclusion that many of them were caused by the angle of the climber point or gaff. When the gaff of the climber was sharpened at one angle, increased pressure from the lineman's weight would tend to drive the gaff deeper into the side of the pole. On the other hand, a somewhat different angle on the climber point would tend to cause the climber to chip or cut out the side of the pole when increased weight was put on it.

We then had the Bell Laboratories study the optimum safety angle and shape of the gaff point. Thousands of impact tests were made to verify this with actual experience.

But we also found that even if new climbers were properly shaped, the lineman in many cases would sharpen them after using them for a while in such a way that the proper gaff shape was lost. We came to the conclusion that we couldn't be certain that linemen would always sharpen their climber so as to preserve this shape. So the Bell Laboratories set down the requirements for a machine grinder which would maintain both the proper sharpness and the proper shape of climbers. Then the Western Electric had such grinders made by an outside supplier and installed them at appropriate locations so climbers can be kept in perfect condition. Our experience with this new arrangement has been very favorable.

Here is a good example of how the combined task force approach may be used—the practical experience of the associated operating telephone companies, the scientific approach of the Bell Telephone Laboratories and the manufacturing and servicing experience of the

Western Electric Co.—all coordinated and guided by the staff experts of the American Company.

Conclusion

I hope that some of these ideas may be useful to you in the safety platform you will be constructing in the workshop sessions to follow. I know the contributions of this task force will be great in the continuous battle we wage against accidents.

But whatever our contribution may be as individuals, we will all have the deep personal satisfaction of working for the fundamental good of our society—safeguarding human worth, preserving life and health. And safety—like the other virtues—is its own reward.

I appreciate your thoughtful attention. I congratulate you for your past efforts. They have been splendid. And I wish this task force every possible success.

The Shape of the Conference

LEO TEPLow, *Assistant Vice President, American Iron and Steel Institute, and Chairman, Program Committee, President's Conference on Occupational Safety*

On a day in which you have already heard from the Vice President of the United States, the Secretary of Labor, one of the new breed of Americans we call the astronauts, the Assistant Secretary of Defense, the President of Crown Zellerbach Corp., and the President of American Telephone & Telegraph Co., anything I may say is likely to be in the nature of anticlimax. My only reason for being here is to emphasize the purpose of this Conference and the manner in which it was designed to work.

First of all I would like to pay tribute to the men and women of the Technical Advisory Committee whose advice and guidance have been so crucial to the planning of this Conference. The fact that safety is a movement rather than a technique became clear at the very beginning; only a movement could enlist the whole-hearted participation, dedication, and enthusiasm which formed the backbone of the planning and execution of this Conference.

By meeting and by letter the members of the Technical Advisory Committee, and especially those who were on the Program Planning Subcommittee, gave freely of their time and effort to build the kind of a Conference that would make a real contribution to the safety movement. I think that you will agree with me that the first day has met that high specification. Nor is it fair to allocate credit without recognition of the devoted work of the members of the staff of

the Bureau of Labor Standards. When I think of the intense devotion to duty, the combination of originality and handling of hundreds of details which they have done so smoothly, it makes me wonder whether the people who talk about bureaucrats in government really understand the nature of government work or the tremendous contribution made by thousands of government employees whose passion for contribution is matched only by their passion for anonymity.

All in all, this Conference has involved over 150 individuals in working on the Technical Advisory Committee, the Program Planning Subcommittee, the speakers, the workshop moderators, panelists, consultants, and staff. Each has approached his responsibility with full knowledge that this is the President's Conference on Occupational Safety, and nothing less than the best will do.

The theme of this President's Conference, "Safeguarding Human Worth," was the outcome of a suggestion made by Dr. Leon Brody of New York University. It seemed to us particularly fitting that this be the theme of the President's Conference, emphasizing as it does the high value we place on the individual and his worth. We are grateful to Dr. Brody for his perceptiveness in identifying the theme, both for our own efforts in this Conference and as a beacon to other countries where human values take second place.

Early in our deliberations, Ewan Clague, Commissioner of Labor Statistics, helped us to identify the areas that require more emphasis. He pointed out that those areas in which we had previously laid the most stress, *i.e.*, manufacturing industries, had made more progress in reducing safety hazards and in inducing safer practices.

It is for that reason that the eight workshops scheduled for tomorrow and the plenary session tonight are largely devoted to problems of general application or those in nonmanufacturing fields. We approach some of these fields with trepidation. We know that we don't have the answers, nor is it likely that the answers will spring into full bloom from this Conference or its workshops. In some cases we shall have performed a useful service if we focus attention on the problem, even though the solution may not yet be obvious.

The role of schools in advancing worker safety has been considered by the President's Conference on prior occasions. It is gratifying to report that, as a direct result of these discussions at previous President's Conferences, a great deal of progress has been made. A report on that progress and an identification of present problems will be made at the plenary session tonight in this auditorium starting at 8 o'clock with presentations by Dr. Lawrence G. Derthick of the National Education Association, Dr. Ewan Clague, Commissioner of Labor Statistics, and a panel moderated by Dr. Walter M. Arnold

of the United States Office of Education. Despite the many other evening attractions in Washington, I am sure you will find this plenary session well worth your while, since all aspects of the safety movement are affected by the manner in which safety is promoted, taught, or neglected in our educational system.

I particularly direct your attention to the workshop on agriculture scheduled to be held in the auditorium of the Department of Agriculture across the Mall starting at 9 o'clock tomorrow morning. Please note that 9 o'clock starting hour, since the other morning workshops begin at 9:30. The agriculture workshop will be an all-day session, in recognition of many difficult hazards characteristic of our versatile agricultural sector.

The workshop to be held in this auditorium tomorrow morning is that of research in safety and the application of that research. For that workshop Dr. Brody has put together an extraordinary panel of experts from different areas of research, including research into communication and application of research findings. As the rate of lost-time accidents seems to be leveling out, the need for a breakthrough through research seems ever more pressing.

For the first time, the Conference is also devoting attention to safety in materials handling in transportation, with attention devoted primarily to materials handling on the railroads and on the docks. That workshop will be held in the auditorium of the GAO Building tomorrow morning.

Finally, the Department of Commerce auditorium will house the workshop on construction safety tomorrow morning, moderated by Gerard Griffin of the Dravo Corporation. The membership of this workshop represents both labor and management, as an indication of the intense interest in improving the safety record in construction.

In addition to the agriculture session which goes through the afternoon, the other afternoon workshops include those relating to public employees, moderated by Robert H. Ferguson of Republic Steel, here in this auditorium; selling safety through associations in the trade and service industries, moderated by Raymond C. Ellis of the Variety Stores Association, in the GAO auditorium; off-the-job safety, moderated by M. F. Biancardi of Allis-Chalmers, in the Commerce Department auditorium; and the use of medico-administrative skills in accident prevention, moderated by Dr. R. Lomax Wells of the Chesapeake & Potomac Telephone Companies. This last workshop, fittingly enough, will be held in the auditorium of the Health, Education, and Welfare Department.

Each of these workshops involves individuals outstanding in their particular sectors of the safety movement. Each merits the atten-

tion not only of safety specialists, but of administrators in both public and private business. My very special problem will be trying to decide which ones to attend when there are four or five concurrent workshops in session.

Finally, on the day after tomorrow, March 8, we are to hear from the President of United States Steel Corp., and the Vice President of the United Papermakers and Paperworkers, AFL-CIO, on ways in which labor and management can combine their talents to contribute to "Safeguarding Human Worth." This is no starry-eyed exhortation for two opponents to shake hands and work together. These two presentations represent the thoughts and conclusions of practical operating men who know whereof they speak. At this point there will be an opportunity for audience participation, and I hope at that time you will give us your frank evaluation of the Conference.

In this connection it is important to point out that each of the workshops is designed to provide a maximum degree of audience participation. It is only by putting yourself into the act that you will get the most out of this Conference. However, I hope that individual participation will be by way of comment and question rather than the making of speeches from the audience, which can only slow up the proceedings and deprive others of the opportunity to participate.

The last speaker on March 8 will be Governor Howard Pyle, President of the National Safety Council. It is with particular pleasure that I look forward to Governor Pyle's inspirational address, for his presentation will mark the culmination of increasing cooperation between the President's Conference and the National Safety Council. It is a great pleasure to acknowledge that help we have received from the National Safety Council in the planning of this Conference. There is no jurisdictional rivalry when it comes to the promotion of safety.

There are a few guide posts to be observed in connection with the President's Conference:

1. It is agreed that the Federal Government's role is to identify and emphasize the Nation's interest and concern in safeguarding human worth. This is supplemented by providing technical information and assistance to those concerned with accident prevention. The Conference is to help people obtain facts and to provide a source of inspiration for further action. It is not designed to influence legislation.
2. The Conference operates through consensus rather than by taking votes on specific issues or adopting formal resolutions.

The final Conference report will be a composite of the reports submitted by the Conference workshops. The Conference report will not become final until preliminary drafts have been circulated and comments received. The Conference report is not only a report to the President of the United States: it is a report to the Nation from those in whose hands lies the responsibility for safeguarding the Nation's human worth.

The official proceedings will include essential papers as well as the conclusions, and copies will be sent to all delegates to this Conference.

Finally, you get as much out of this Conference as you put into it. The material and the knowledgeable people are here. It is our devout hope that the Conference will help to provide both the opportunity for more effective safeguarding of human worth and the inspiration to work everlastingly at it.

Part III

The Role of Schools in Advancing Worker Safety



Panel on "Mobilizing Educational Resources." Dr. Willard M. Bateson, A. Lester Cunningham, Dr. Walter M. Arnold, Mrs. Fred Radke, Dr. Hubert Wheeler.

THE ROLE OF THE SCHOOLS IN ADVANCING WORKER SAFETY

Chairman: DR. WILLIAM B. LOGAN, *President, American Vocational Association; Director, Distributive Education Institutes, The Ohio State University*

DR. LOGAN. The history of this Conference in its brief span of 7 years offers abundant evidence of manifold contribution to our Nation and its citizens. The dedicated service of scores of people who have made preparations for this Conference and the manifest interest and presence of the Vice President of the United States and the Secretary of Labor have brought dignity, prestige, and force to the prominence and respect which the Conference holds in the eyes of the people.

The purpose of this plenary session is to investigate and consider the role of the schools in advancing worker safety. Your presence here tonight is evidence of your interest and that of the organization that you represent in stemming the tide of preventable accidents among youthful workers. The first requisite for corporate safety is sound judgment on the part of employees. Call it instinct, horse-sense or whatever you might, many accidents would be avoided if the employee's first intuition to do the job safely had been obeyed.

Now in this program of safety we can provide face shields; we can provide heavy-toed safety boots; we can provide gas masks; we can provide asbestos gloves; we can provide all kinds of warning signs around the plant; and we can provide safety helmets (hard hats) for the people to wear, and in spite of all this, we still cannot avoid injury. We can have safety indoctrination programs, we can have signs all around the plant, all kinds of literature. However, none of these precautions will save the worker who chooses to ignore the good sense which dictates their use. That worker will continue to have accidents. When the worker ignores precautions that would protect and safeguard him from harm, he also ignores the contributing sorrows, the suffering, and frustrations which follow in the wake of accidents.

Here is one simple answer. Today we have 3½ million Americans living and working around the world. Suppose every one of these Americans were as sensitized as the best of Americans to our vital need to communicate to other peoples a clear image of democracy, of our

way of life, of our spirit of peace and good will and brotherhood. What a marvelous impact they could make. Many of the Americans scattered around the earth this year were in our schools last year, and many enrolled today will be in numerous other countries tomorrow. We must prepare them for the new diplomacy. We can win other nations in the same way that we win individuals—through an understanding of their problems, through a sharing of their needs and by making our ways of life attractive to them.

But we must not stop with teaching about democracy. Our principles must find expression in the examples that we set and we must be alert constantly to devise and take advantage of situations and experiences that will give our youth the privilege of practicing democratic principles as they seek to attain purposes which for them become dynamic, reasonable and worthwhile. We must teach the simple virtues of democracy—the personal sacrifice that it may involve, the charity it should encourage and the idealism which makes it a living thing. The ideals of democracy aren't changing, but we must teach them in the context of a changing world.

Finally, and above all else, we shall conserve and enrich our human resources to the maximum only if we re-emphasize the moral and spiritual values which are the essence of democracy. In all of our teaching we must reiterate and re-emphasize the old-fashioned virtues which have made Americans strong, but which are sometimes lost sight of in a frustrated and explosive world. And what are these old-fashioned virtues that form the bone and sinew of democracy? They are self-reliance, thrift, industry, honesty, charity, friendship, kindness, justice, mercy, and understanding. They also partake of the things of the spirit; of prayer and meditation and the good life; of one Nation, under God, indivisible, with liberty and justice for all.

Increased mechanization in today's world affects larger and larger numbers of people and poses increased hazards and threats to young people. It is doubtful if all of our industrial education programs can be quite as effective if safety common sense is not deeply implanted during the early years of youth.

We are here this week to discover ways to motivate workers to develop an active concern for their own safety and that of their fellow workers. We must condition youth for safe employment. Worker safety on the farm, in industry, in business, and in the home has been of primary concern to vocational educators for over four decades. It is natural that the American Vocational Association has been an integral part of this Conference since its inception. As one of the representatives of our Nation's educational program, I am happy to

see the manifested interest of this group in the schools' role in advancing worker safety.

The Committee of Program Consultants has prepared a most interesting program. We believe that it will be inspirational, challenging, and that it will stimulate action. The audience will have an opportunity to participate in the discussion. Those very important people who deserve and who will get recognition here tonight are members of the Committee of Program Consultants. These are the people who are the planners of this Conference. [Introduced members of program consulting group.]

Conserving Human Resources Through Education

DR. LAWRENCE G. DERTHICK, *Assistant Executive Secretary for Educational Services, National Education Association*

(Excerpted from address.)

I have been asked to speak in more general terms on "Conserving Human Resources Through Education." Nevertheless, at the outset, it seems appropriate that I should stress particularly "Conservation of Human Resources Through Safety Education," and this I shall do. It would require volumes to report the research, to outline the programs and bibliographies, and to describe the significant programs in safety education in our schools.

We of the National Education Association, through our National Commission on Safety Education, have been proud of our share in helping to develop and promote school safety instruction and in these endeavors we are indebted to a number of organizations and agencies for support, for cooperation, and for coordinating activities.

That you may sense the broad scope of the programs of the National Commission, which are actually, and should be, as broad as education itself, let me summarize briefly. There is the timely safety and science project including material on amateur rocketry; the work with the driving simulators; the development of standards for school buses; materials for the primary grades; policies and practices for driver education; a 16-page special feature, which went to nearly a million readers, dealing not only with driver education, but with fire safety, school bus and disaster preparedness, with suggestions for incorporating safety education in several curriculum areas. We have the National Student Traffic Safety Program, now in its fourth year of operation; and the National Student Safety Association, which gives thousands of students opportunities to assume citizenship responsibilities and to exert leadership for safety.

The Commission also provides packet service for timely and useful instructional materials, including educational films; answers requests

for information by mail by the thousands. It does research and issues an important newsletter entitled, "Action for Safety."

There are posters and publications of every kind to give guidance to the increasing number of teachers in schools who accept responsibility for safety instruction.

In our efforts at school, we seek to teach children to live safely but not fearfully. We strive to keep ever before them the startling facts about losses and suffering due to accidents and fires.

While it is difficult to evaluate the results of safety education, there are tangible figures which are most heartening to contemplate, and which should encourage us tremendously in future efforts. Here are some examples:

1. Accidental death among children 5 to 14 years old dropped from an average of 9,500 each year in 1923-32 to only 6,500 in 1959.
2. The number of accidental deaths per 100,000 population declined from 73.2 in 1940 to 52.2 in 1959.
3. Research studies have indicated reductions from 40 to 66 percent in the number of accidents and traffic law violations by students who have completed courses in driver education, compared with similar groups who did not have the benefits of this instruction.
4. The death rate per 100 million miles of travel in motor vehicles has decreased from 16 in 1935 to 5.4 in 1959.

To be sure, we can attribute only a portion of these reductions to the effects of safety education in the schools. But every agency in society has an important role, for we can and do save lives and prevent suffering through effective techniques in safety education. What good is it to provide the highest quality education which makes young people fit in mind and body and spirit if through lack of knowledge they move in life in such a way as to become maimed or crippled or killed by preventable accidents?

Our dropout problem is another of serious concern. Unless we can keep youngsters in school, we have no chance for conservation, safetywise or otherwise. This is an age when out-of-school youth have little else to do than to make trouble; to become, in the words of Dr. Conant, social dynamite. Today, one out of three drop out before high school graduation. That this compares with two out of three dropouts 30 years ago is small comfort, for in this age of automation, there will simply not be enough low-level jobs for the untrained, or even for those who do not keep up.

If the present dropout rate continues we shall have 7.5 million of these educational cripples within this decade and one-third of these will have less than an elementary school education. That such a hazard should loom ahead is devastating in a time, not only of rapidly

advancing automation, but also when brain power is the basic factor in the cold war.

The tragedy of this situation is that we already have the know-how for retaining most of these young Americans; to prevent to a very large degree, even now, this dangerous waste of our human resources. We know most of the causes and we know the treatment. In some schools and in some communities we have the resources to do the job—in terms of richly diversified curricula, highly trained personnel, including guidance counselors and clinics, school social workers, cooperating and adequate community agencies, facilities for enlisting and working with parents, combined programs of work and school; and otherwise the means for keeping and teaching these boys and girls.

We can, then, conserve these human resources, if we have enough of what it takes to provide the modern tools to hold them, or recover them—the modern tools still denied to so many of our schools because not enough Americans yet are awake to the explosive hazards of these dropouts, whose constructive energies are so sorely needed by our country.

We can count our losses in the millions due to the dropout problem but there are grave losses yet undetermined due to problems in mental health. Many boys and girls fail to use the school up to capacity because they are emotionally and/or mentally ill. Again, the better schools have made great progress in recognizing symptoms and in providing qualified personnel to treat these ills and to help in removing the causes.

The able school seeks to develop what Dr. Earl C. Kelly has called the fully functioning person. Dr. Kelly describes him as a person who thinks well of himself. The good teacher in days gone by instinctively knew the power of the good self-image, and how one who had the good self-image was able to achieve considerably beyond that which his ability promised. Now, however, the findings of research have not only confirmed the intuitive wisdom of the good and experienced teacher, but have given a great new emphasis to this reality. Some of the things being done today in building human resources through the good self-image are thrilling.

The teachings of Dr. Kelly and men like him, will suggest great new vistas of responsibility for the schools. Unfortunately, all too many of our schools are unprepared to meet this responsibility for lack of available tools and services and thus we continue needlessly to waste our human resources.

Obviously, the school today must meet new and much heavier demands for quality instruction, for the greatest possible develop-

ment of each child in body, mind and spirit; for the correction of each weakness, for the sharpening of each talent. Only thus can we fully conserve our human resources through education.

This evening I have chosen for special emphasis certain critical aspects of my subject which too often escape the focus of public attention. Another one of these has to do with the development of our citizens in the area of responsible citizenship for the space age. My own convictions have been confirmed by wiser men than I to the effect that one major reason for certain dangers and hazards we face today is that our people for the past 10 or 15 years have not been sufficiently sophisticated in their knowledge and judgments about communism. We must not only teach our youngsters to think straight about communism, but also we must sharpen their concepts of other issues and threats that confront freedom today. And tomorrow will be even more complex in terms of requirements for clear judgments, quickly and soundly made, by the rank and file of our people.

We have long accepted as a primary objective of our schools the task of teaching youngsters how to think, and this goal gains deeper significance by the hour. The only difference is that now we must teach them to think fast, as well as straight. We simply cannot give them the answers for tomorrow. The only thing we can do is to teach them to find the answers within a framework of democratic ideals. And this process of finding the right answers must be initiated in the nursery school and promoted every day thereafter.

Responsible citizenship also requires that we communicate a clear image of democracy to the uncommitted people of the world. It is vital that we win the understanding and good will of these people if we are not to lose the cold war and be isolated in this world of change when new world-wide contacts and population shifts will even more affect all world relationships tomorrow. How disastrous it is when other nations have a perverted view of us we have seen only too often. How can we, how can the schools, tackle this problem to insure the conservation of human resources in a climate of freedom?

Work Injuries Experienced by Minors

EWAN CLAGUE, *Commissioner of Labor Statistics, U.S. Department of Labor*

At the last President's Conference on Occupational Safety we took a look into the future and predicted that our total labor force would rise from its 73.6 million level in 1960 to about 87 million in 1970. From today's vantage point, this still seems to be an entirely justified prediction.

More significant to the discussion tonight, we also predicted that young workers under 25 would account for about 46 percent of the

total increase in the number of workers. In the 18-20 age group—from which most of our young workers come—the expected expansion will be from less than 10 million to nearly 15 million in 1970. This growth will be progressive, with a very sharp rise in 1964 and 1965. Over the 10-year term the number of young persons reaching 18 years of age will increase from 2.6 million per year in 1960 to 3.8 million per year in 1970.

These figures are not just predictions to those of you in the educational field—they are realities. They represent the young people now passing through our educational system under your care and guidance. You have the responsibility of preparing them to take their respective places in our labor force. And I believe everyone here will agree that this responsibility includes some indoctrination as to the hazards they may encounter in employment, and the development of a safety consciousness which will help them to avoid those hazards.

Many employers feel, and on a strictly a priori basis, I'm afraid, that young workers are particularly susceptible to work injuries because of their limited experience, lack of mature judgment, inclination to take chances, lack of ability to concentrate, and limited physical abilities. Unfortunately, we have very little factual data by which we can appraise the validity of these concepts, either separately or as a group. Few, if any, existing research agencies have the resources to make effective studies in this subject area.

Much as we would like to know how the injury experience of young workers compares with that of older workers performing similar tasks, we must face the fact that the collection of significant data of this kind is nearly impossible. Records which would yield such information are practically nonexistent. We must admit, therefore, that we cannot at present measure objectively the effectiveness of the safety training provided for our young people before they enter the labor force.

But the need for some information about the injury experience of young workers to guide their training is pressing. Perhaps, if we knew where and how they are injured, what they were doing when injured, and what materials or substances inflicted their injuries, we might be able to do something to minimize injury occurrence in this important segment of our new labor force.

Those of you who have engaged in statistical research will realize, I am sure, that a very large number of case records would be required to support any reliable conclusions on these subjects. To collect this volume of records from the files of individual employers would have been far beyond our resources. We realized, however, that a wealth of information in this field reposes untouched in the files of many workmen's compensation agencies. We turned to them for help, and

the eight States we selected as a sample agreed to cooperate. They were: California, Connecticut, Illinois, Mississippi, North Carolina, Ohio, Pennsylvania, and Wisconsin.

These States, we believe, represent a reasonable geographic and industrial cross section of the country. Of equal, or perhaps greater importance, they reflect the wide range of variations in workmen's compensation coverage and in the degree to which the employment of young persons is restricted by State law or regulation.

These factors are extremely important in the analysis of the data. We must face the fact that we have information drawn from eight separate and essentially different universes. Even though the materials have been tabulated uniformly we still cannot logically combine them into a single summary. Nor can we make direct comparisons from State to State because of these underlying differences. For example, only two of the States in the sample had compulsory coverage for agricultural workers. In those States we found records of many agricultural injuries. In the other States there were relatively few agricultural injuries recorded. In an unqualified comparison this might seem to imply that agricultural work is much safer in some States than in others or that in some areas very few young people engage in agricultural work.

Both of these conclusions would be unjustified. As a matter of fact, there are fewer restrictions on the employment of young people in agriculture than in most other industries. Agriculture, moreover, offers more opportunities for employment during school vacations than do other industries. We know that many of the very young job seekers—those under 18—do go into agriculture, and where the records were available, we found that considerable numbers of them experienced injuries in this work. Somewhat similar circumstances prevail in the trade and service industries. These are prime areas of employment for the school-age group, and here we found a high concentration of injuries to the under-18 workers. Substantially lower proportions of the injuries reported for the under-18 age group fell in manufacturing or construction.

The reverse was true in respect to the 18- through 20-year age group. Their injuries tended to concentrate in manufacturing, trade, and construction. For them there are few employment restrictions, and generally they are candidates for full-time employment. The somewhat different industry pattern for their injuries, therefore, reflects primarily the areas where they are predominantly employed.

I am not going to take up the findings of our study in detail. You will find the details reported elsewhere. But I do want to touch on some of the highlights, which may offer some clues as to the kinds

of safety training our educational system should offer young people.

I have already referred to the industries in which we found high concentrations of injuries to young workers, but I think this bears repetition. In brief summary, for youngsters under 18 years of age we found evidence that their injuries tend to concentrate in trade and agriculture with manufacturing ranking third. For the 18- through 20-year olds, however, the heaviest concentration of injuries tended to be in manufacturing, followed by trade, construction, and agriculture. It seems indicated, therefore, that the earliest safety training offered our students should be related to the hazards encountered in trade and agricultural activities, and that the hazards of manufacturing should be stressed in the later years of high school. Obviously, this means that safety instruction should not be limited to the operation of machines used in the shop courses.

This observation is borne out by the fact that in all the records studied, the leading activity in which young people, both over and under 18 years of age, were injured was that of manually handling materials. In most of the States the activity of operating machines ranked lower as an injury producer for the under 18's than did the use of handtools and simple bodily motion. The latter is the term we use when the activity consisted merely of moving about in the workplace, with the attendant risks of slips, falls, and bumping into objects.

The *source of injury patterns* found in the different States were far from consistent—by this term we mean the object or substance which directly inflicted the injury. As a broad generality, however, the emphasis was very much on objects which the injured persons were handling, such as boxes and other containers, handtools, working materials, and scrap materials. These are the things which produce cuts and lacerations, crushed fingers and toes, and sprains and strains. Vehicles were an important source of injury in each of the States—this term, incidentally, includes both highway and plant vehicles. In many, but not all, of these cases the injury resulted from the person being struck by the vehicle. Each State also had a significant volume of machine-inflicted injuries, particularly among the 18- through 20-year olds. These, unfortunately, are more important than their number suggests, since they tend to be of greater than average severity.

For a general appraisal of training needs, the *pattern of accident types* probably yields the most pertinent information. This is the tabulation which tells how the injuries occurred and identifies the kinds of events workers must be trained to anticipate and avoid. It seems highly significant that in every State the leading accident type was that in which the injured person was struck by a moving object. This group includes some cases involving moving plant ve-

hicles and some cases involving objects which fell from elevations. But the great bulk of these cases were instances in which the young worker dropped on his toes the materials which he was handling, or struck himself with his tools.

The second most common type of accident was that in which the injured person was caught in, on, or between objects. Most machine accidents fall in this general category and we certainly cannot ignore them, since a large number were recorded. But here again a high proportion of the cases consisted of the worker having some part of his body crushed under or between objects he was handling.

The most simple illustration of this kind of event is that in which a worker moving a heavy object grasps it in such manner that his fingers are pinched under it when he sets it down, or are pinched between it and some other object as he moves it. These are not spectacular events, but they frequently result in the amputation or loss of use of fingers, hands, or arms.

We also found a substantial volume of overexertion cases. These were instances in which the young workers attempted to perform tasks which were beyond their physical abilities, or undertook strenuous activities without knowing how to protect themselves against undue strain. Back strains, arm and leg strains and hernias commonly resulted from these unfortunate events. All of these are injuries which can have residual effects to plague and possibly restrict the activity of the injured person for the rest of his life.

Before I touch on the other kinds of accidents commonly experienced by young workers, let me emphasize again that the three most common classes of accidents which I have mentioned are all closely related to manual handling of materials. It seems evident that young people need *instruction on how to lift and move materials safely*. They need *training on how to use handtools safely*. And they need to be taught *that their physical abilities have limits*, and that it is not "chicken" *to ask for help* when confronted with an overly strenuous task.

Falls were also an important category in the accident experience of young workers, with falls from elevations only slightly outnumbering falls on the working surface. From the records it seemed obvious that many of these accidents were directly related to poor housekeeping and other environmental hazards of the workplace which the employers should not have permitted to exist. This, however, does not lessen our responsibility for training our youngsters to recognize and avoid such hazards. They need to be taught *to watch for slipping and tripping hazards*. They need to be taught *how to use ladders safely and not to use makeshift supports* to reach high places. And in a more homely vein, they need to be taught that

it is neither safe nor smart to jump from elevations rather than taking time to descend in a more conventional manner.

The last of the major categories of accident types on which I shall comment is one which consistently plagues the safety engineer. This is the simple act of striking against or bumping into objects. We found many records of accidents of this variety. Here again it is obvious that many of these accidents stem from unfavorable conditions in the working environment, such as congestion and improper placement of materials and equipment, which effectively constitute booby traps for the unwary. It is equally obvious that inattention and undue haste on the part of the individual involved commonly contribute in some degree to the occurrence of most of these accidents. If young people could be made aware of the fact that they will encounter such hazards in employment and alerted to watch for and avoid them, they might substantially reduce their work-injury record. And, hopefully, if their safety consciousness were sufficiently stimulated, we might find them becoming leaders in the elimination of such hazards.

In brief summary, I want to emphasize that our study did not yield an answer to the question, "Do young workers have a higher incidence of injury than older workers?" But we were impressed by the volume of injuries experienced by young workers, and we did obtain some insight as to where and how young workers are injured in their employment. All the evidence seems to indicate that their record could be improved by *broadening and intensifying the safety training given to them during their schooldays*. Most important in this connection is the rather obvious conclusion that effective safety training for our youngsters must not be limited to instruction in the safe operation of the machines they encounter in the schoolshops.

Chart 1

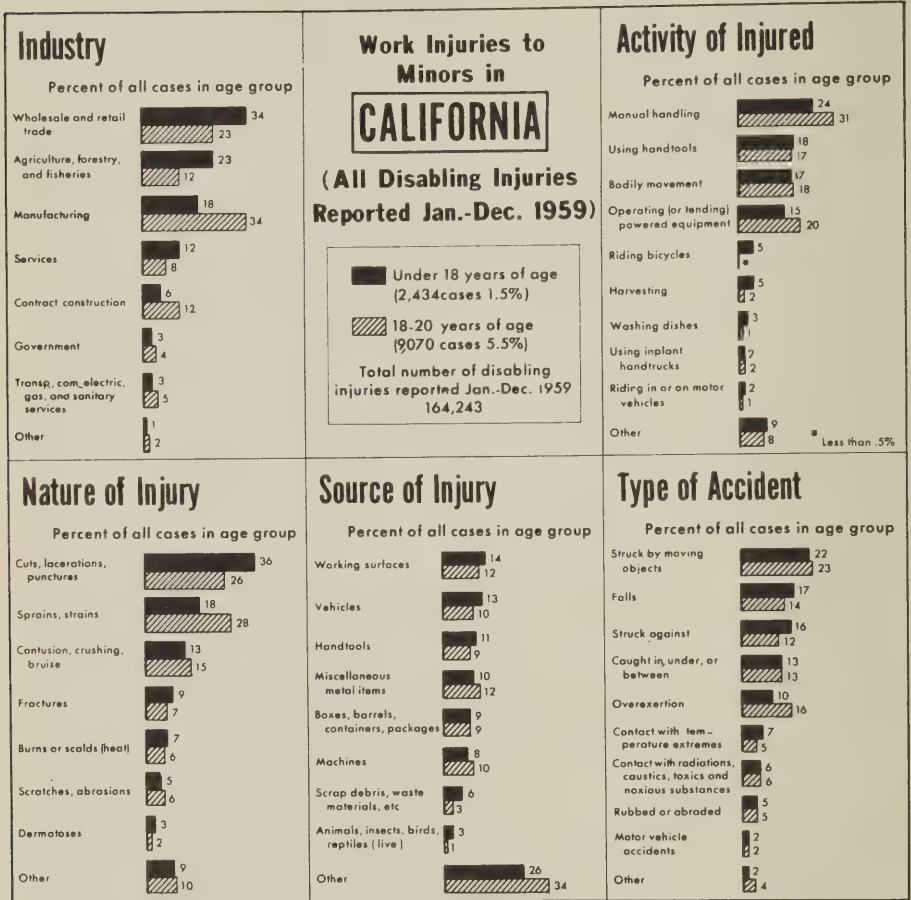


Chart 2

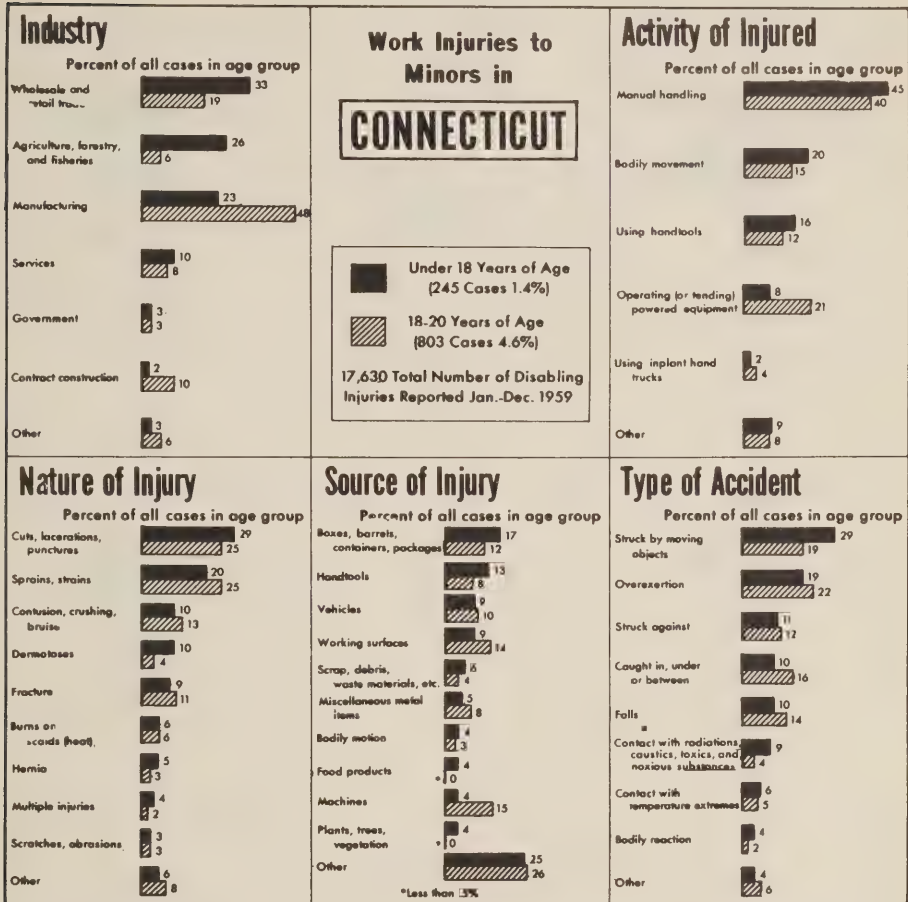


Chart 3

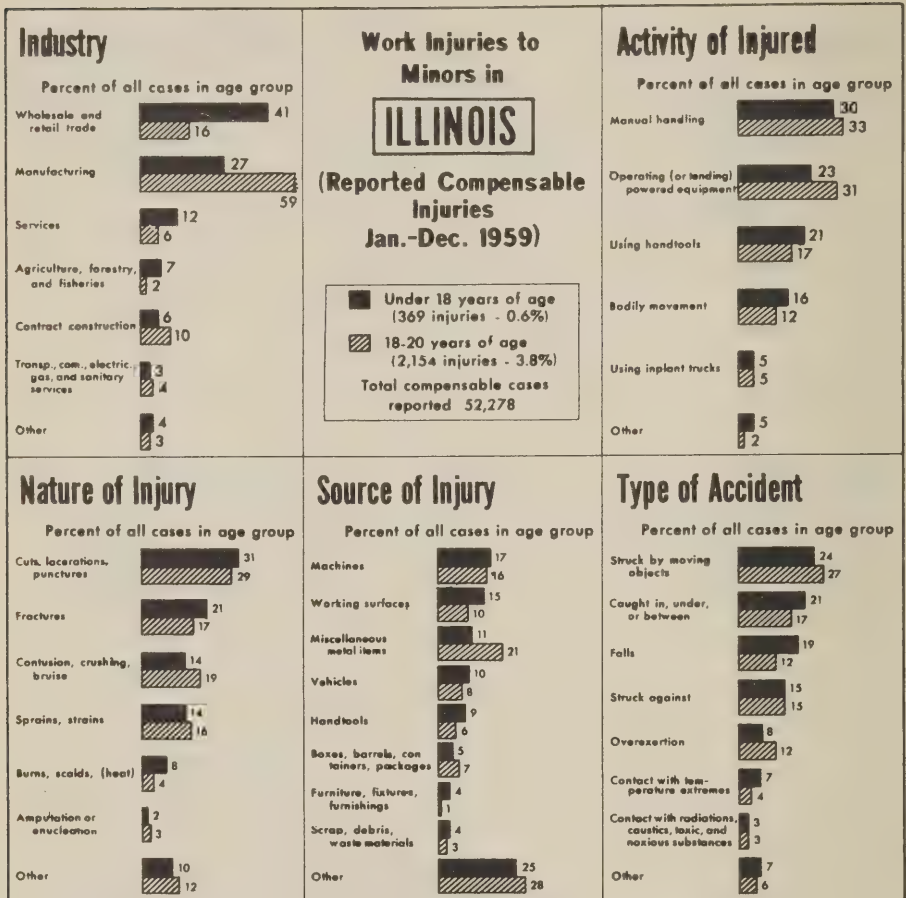


Chart 4

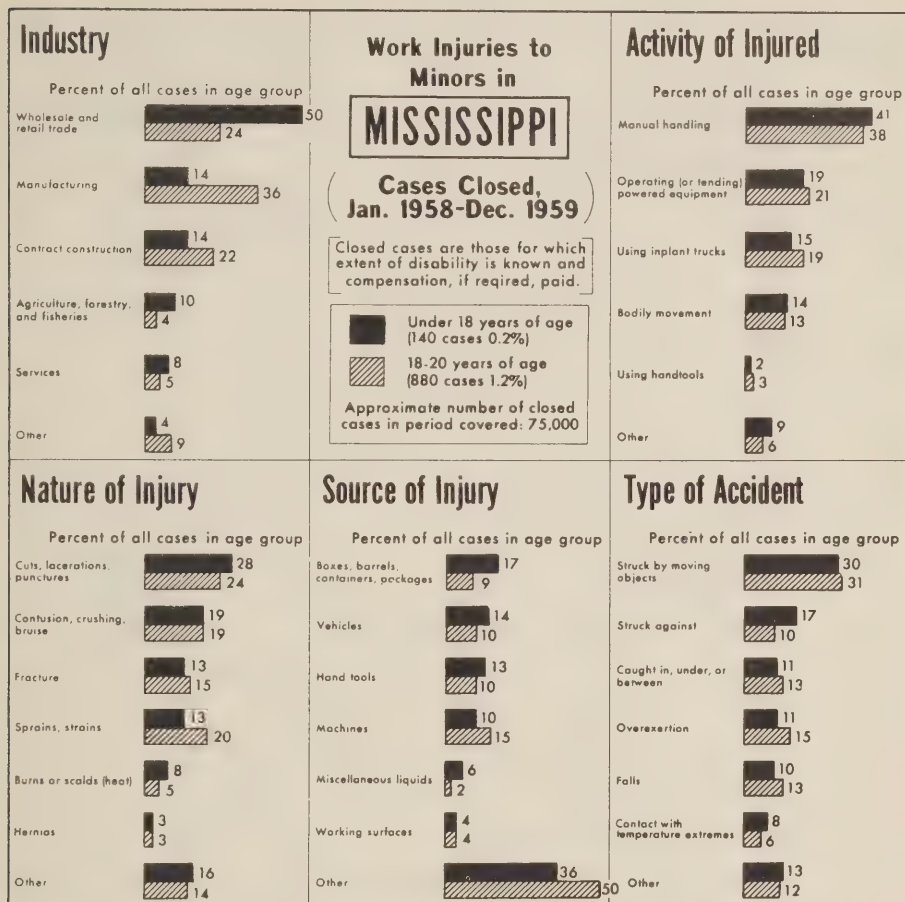


Chart 5

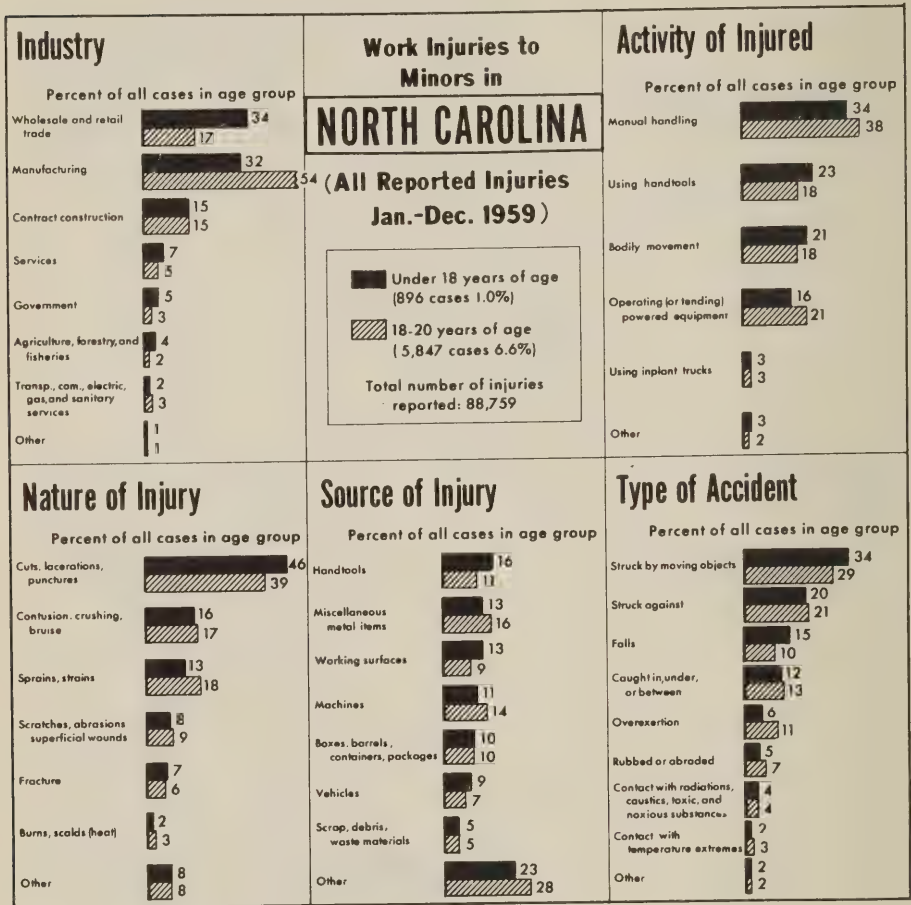


Chart 6

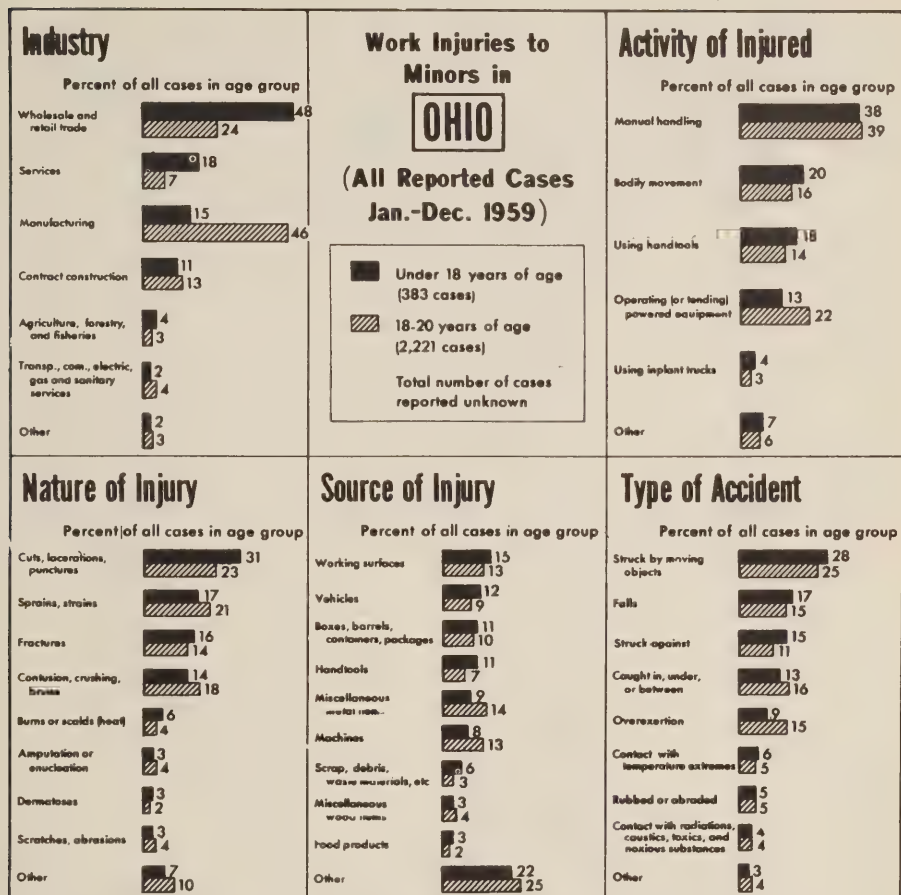


Chart 7

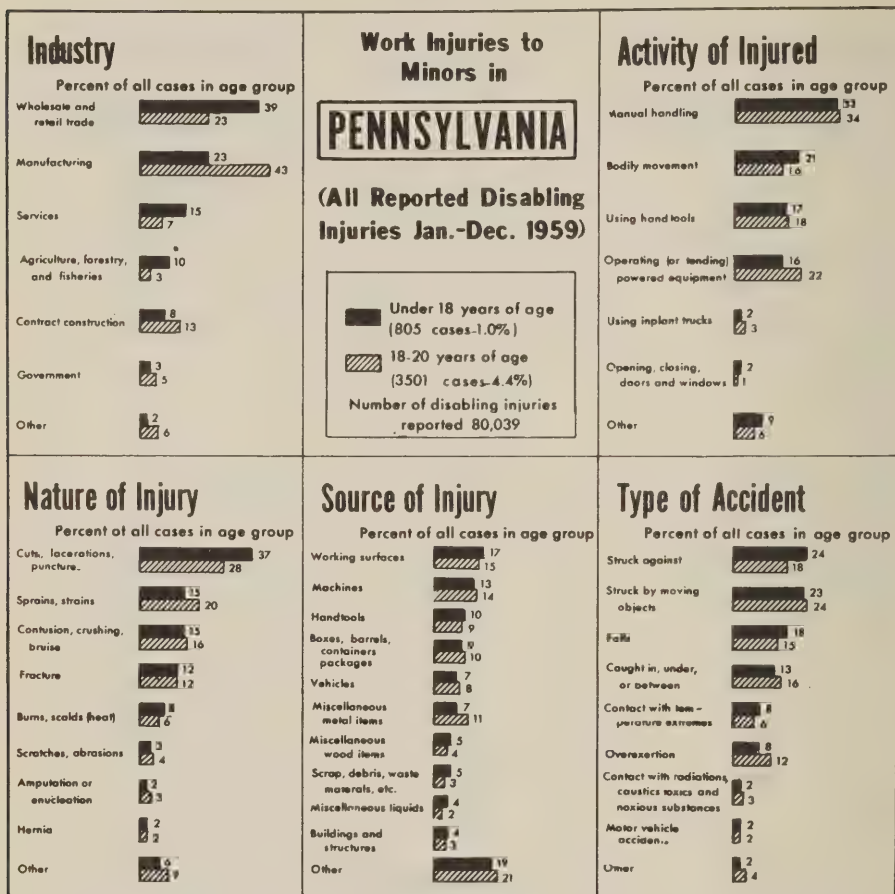
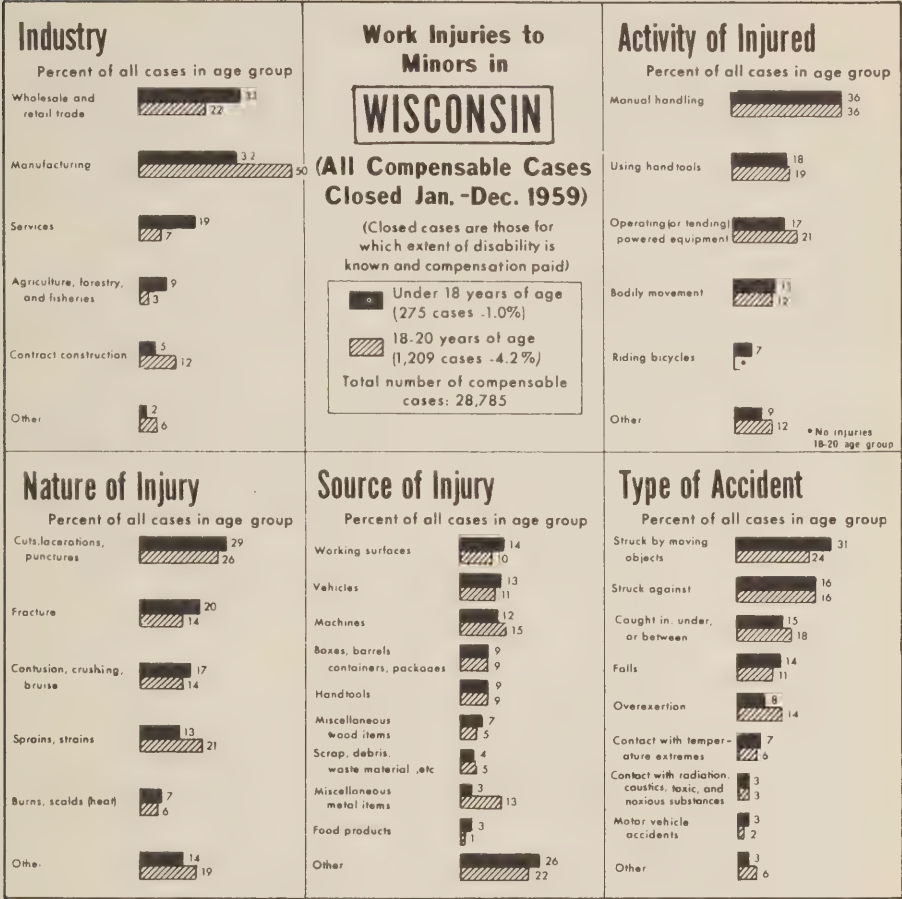


Chart 8



Panel Discussion

"Mobilizing Educational Resources for Action"

A panel of experts representing various levels in the educational system discussed the part played by each segment of the school system in meeting more fully the schools' responsibilities for (a) preventing accidents and injuries among the school population, and (b) preparing students for careers as safe workers after they enter the labor force. (See *Conference Report*, p. 89.)

With DR. WALTER M. ARNOLD, Assistant Commissioner for Vocational Education, U.S. Office of Education, as Moderator, the panel was made up of the following:

DR. WILLARD M. BATESON, Professor of Industrial Education, Wayne State University, Detroit, Mich., and President, National Association of Industrial Teacher Educators.

A. LESTER CUNNINGHAM, Supervisor of Vocational Education, Public Schools of Gary, Gary, Ind.

MRS. FRED A. RADKE, Member, Washington State Board of Education, and Second Vice President, National School Boards Association, Port Angeles, Wash.

HUBERT WHEELER, State Commissioner of Education, Jefferson City, Mo.

A committee of consultants for this plenary session had as Coordinator, DR. JOHN P. WALSH, Director, Trade and Industrial Education Branch, U.S. Office of Education. These consultants included:

S. A. Abercrombie, National Education Association

Lowell Burkett, American Vocational Association

Edmund D. Crosby, College of Education, University of Maryland

A. L. Cunningham, Public Schools of Gary, Gary, Ind.

Howard K. Hogan, U.S. Office of Education

Dr. Wayne P. Hughes, National Safety Council

Denis J. Kigin, Arizona State University

Edward B. Landry, U.S. Post Office Department

Clyde P. Smith, Bureau of Labor Standards

Dr. William A. Williams, Pennsylvania State University

Part IV

Safeguarding Human Worth Through Joint Participation



Platform Guests for the Closing Session, March 8. Messrs. Al. E. Brown, James J. Reynolds, Howard Pyle, Leslie B. Worthington, Leo Teplow, Arthur W. Motley.

SAFEGUARDING HUMAN WORTH THROUGH JOINT PARTICIPATION

Session Chairman: HONORABLE JAMES J. REYNOLDS, *Assistant Secretary of Labor*

MR. REYNOLDS. Good morning to all of you, ladies and gentlemen. I would like to call to order the plenary session of the President's Conference on Occupational Safety. It is gratifying to note that the unfriendly weather that met you here in Washington has passed away and that once again we have lovely sunshine and clear skies. To me it has been a source of great inspiration that, despite the inclement weather, the attendance at your sessions has been uniformly good, and I think this is a measure of the devotion which all of you have to this very important matter of safety. You are to be commended for it and, on behalf of Secretary Goldberg and all of those responsible for the planning of this Conference, I extend to you a heartfelt voice of gratitude.

I am Assistant Secretary of Labor James Reynolds. Secretary Goldberg has been called up to the Hill to testify before a congressional committee and regretfully cannot be here at this moment, but I expect he will join us later.

I would like to take this opportunity to express a word of sincere thanks from all of us for the uniformly high caliber of contribution which has been made by the moderators with the various sessions of this Conference. I wonder if the various moderators, whose names I will call out, will be kind enough to stand very briefly so that we can express our appreciation in a round of applause. It seems to me the minimum expression of the debt we owe to them.

Dr. William Logan, President of the American Vocational Association; Dr. Leon Brody, Director of Research, The Center for Safety Education, New York University; Mr. W. B. Wood, Director, Cooperative Extension Service in Agriculture and Home Economics, Ohio State University; Robert Gidel—from our own family here in the Department—Chief of the Division of Safety, Bureau of Labor Standards; Mr. Gerard Griffin, Manager of Hazard Control of the Dravo Corporation; Mr. R. H. Ferguson, Assistant Director of Industrial Relations, Republic Steel Corporation; Mr. Raymond C. Ellis, Man-

ager, Member Relations, Variety Stores Association, Inc.; Mr. M. F. Biancardi, Manager of Safety Service of Allis-Chalmers Manufacturing Co.; Dr. R. Lomax Wells, Medical Director of the Chesapeake & Potomac Telephone Companies. If you will all be kind enough to stand for a moment, I would like to have the audience join with me in a vote of appreciation and applause. Thank you.

Now this perfectly magnificent and uniformly high character of your discussion, it seems to me, is something which is carried on again this morning in the wonderful opportunity we have to hear from some of the outstanding men in this country in the field of safety—men who have demonstrated by their records in the past and their present activities a devotion to this subject so important to all Americans. Since we met 2 days ago, your thoughts have been directed into space by that attractive young man, Major Cooper, and to fallout shelters beneath the earth by Assistant Secretary Pittman. I suppose we have been up in the air and we have been below the ground, in a way. You have participated in the various workshops of your choice, and from the provocative discussions which ensued, I feel certain that this is one conference where there is a very real and vital nexus between discussion here and the grassroots area of problems at the plant level, highway level, home level, and every area where Americans suffer disability and injury. You have considered the devastating statistics of injury and death in our country, and I am sure they have served to further alert you to the terrific problem that faces all of us. I think that one theme certainly has run through this Conference, and indeed has run through the mind and the philosophy of every intelligent industrial leader. It is the fact that sound safety progress obviously depends on the attitude of top management toward, and the full assumption of responsibility for, the problem of safety.

This morning we are going to hear from two men who have lived well this question of responsibility of management and that other vital area—responsibility on the part of labor. Certainly, even with a dedicated attitude at the top management level, without an awareness and a fully cooperative attitude on the part of labor, no program can be truly an effective device for safety. Our management representative this morning was born in England, and came to this country many years ago as a little boy of 5 (a distinguished predecessor of his addressed this Conference some years ago—the late and beloved Ben Fairless). Like Mr. Fairless our guest speaker this morning is the son of a miner, and I think it not without significance that these two men, sons of miners who toiled under the surface of the earth in one of the most hazardous industries known to men, are men who were dedicated in their industrial lives, with all of their responsibilities and capabil-

ities, to this question of industrial safety. I think also that it is not without significance that our speaker was an extraordinary salesman, among his other talents, and good safety is a sales job, as you know. It is a strange thing in this business of safety—you have to sell the idea for a person to save himself, and this is essential to a good safety program.

Our speaker is Mr. Leslie B. Worthington, the distinguished President of United States Steel Corp. A graduate of the University of Illinois, he was a sales apprentice for the Illinois Steel Co. in Chicago, and moved up the ladder, as we all know. I could talk at length about his career, but I know it would embarrass him and would keep us from the privilege of hearing from him.

I think one of the most significant things, however, is that when Mr. Worthington was President of Columbia Geneva Steel Corp., a few years ago, he was dedicated to this whole question of safety—all aspects of it. He was a Director of the Traffic Research Council, I believe it was called in California, among other things. And certainly it was the Columbia-Geneva Steel Division of U.S. Steel which has shown many people the way to a good program of industrial safety. It is a real privilege and a pleasure to introduce to you the President of the United States Steel Corp., Mr. Leslie Worthington.

“ . . . And the Whole World Will Be Clean ”

L. B. WORTHINGTON, *President, United States Steel Corp.*

While I would not presume to speak for Mr. Brown, I suspect he may share with me a better idea this morning of how our Nation's astronauts must feel when the countdown reaches zero.

The situation is somewhat reversed, of course; their journeys are through regions of space relatively unknown and unexplored. On the other hand, my cospeaker and I—and later, Governor Pyle—must travel into an area which you people have spent 2 full days exploring and discussing quite extensively. And the thought has not escaped me, either, that for many of you, safety is your life and career.

Under the circumstances, therefore, the chances are very slim for my saying something new, something you have not already heard. But while I have no illusions about achieving, in our flights of discussion here this morning, anything close to the success gained by our astronauts in their field, I can assure you that safety, to me, takes a back seat to no other subject—not even space exploration.

Safety may appear at times to lack the glamour of other subjects, but it is nonetheless a vital topic. It may not always command nationwide television audiences, but it must continue to command the attention of the American people. And such attention and interest are certainly valuable byproducts of these Presidential Conferences.

The invitation of Secretary Goldberg on behalf of President Kennedy to join you here in Washington was very welcome. Like my colleagues in the steel industry, I have a very deep concern for the continued safety of steel and all other industrial employees—both on and off the job.

For many years, my specific interests in the steel business centered about the markets for steel. My line, as they say, was selling. It was with both surprise and pleasure, therefore, that I noted on the Conference program one of the workshops which you held yesterday afternoon—the one which began with the words “Selling safety . . .”

This, of course, would have been a topic right up my alley. And even though I may be a day late, I believe a few additional thoughts on that subject would not be out of order; for “selling safety,” or being “sold” on safety, is a fundamental aspect of this whole, broad subject.

It was more than half a century ago that organized safety programs got underway in the steel industry. The exact date for United States Steel was 1906. Since then, we believe an outstanding job has been done, and I make no bones about it, we're proud of our safety record in U.S. Steel and proud of the general record of the steel industry as a whole—even though we realize that so long as there is a possibility for one man to suffer one injury, we must continually strive for improvement.

Incidentally, my use of the pronoun “we” is not a reference only to safety and other management people. I'm referring to employees and management alike, for our safety efforts are cooperative efforts of all employees in which everyone can take pride.

In our company, we have reduced the rate of disabling injuries almost 98 percent during the past half century, and the entire steel industry has experienced something like a 96 percent decline in such injuries. We are closing in on that long-sought goal of “frequency zero”—and in some of our operating locations, this has been accomplished during a calendar year.

It was a group of iron and steel engineers who, back in 1911, organized what is said to have been the first industrial safety committee. Out of this activity came the largest and, I believe, one of

the finest safety organizations existing today—The National Safety Council. The steel industry has shared its safety experience in countless other ways, including assistance to educators desiring to incorporate safety instruction into vocational and other types of public and private education.

A simple listing of these and other facts and figures, however, cannot tell the whole story. The real significance of steel's safety achievement lies in an area not often mentioned or considered—the fact that within the steel industry, particularly in our steel producing operations, the ingredients exist for almost every known industrial hazard.

We work with molten metal and, occasionally, we must use corrosive acids and caustics as well. There are high temperatures and there are liquids and gases under pressure. Our machinery ranges from the lathes and drill presses of a machine shop to massive rolling equipment that sends steel strip out its finishing end at speeds which, in an automobile, are permissible only on limited access highways.

In addition to steel-producing operations, steel industry jobs take our people high above ground, as in the case of bridge and other construction, and down into the depths of the earth in mining operations. We experience the same safety conditions and problems which are found in automotive and railroad transportation. As our safety people often remark, "You name it; we've got it."

I mention these conditions, because it is in the face of them that the steel industry has achieved a prominent spot among the industries listed by the National Safety Council as the safest in America. It is in the face of these conditions that a steel mill has been made several times safer than the average American home. Millions of man-hours have been worked in our plants without a single lost-time injury—the record of more than 17 million man-hours, I'm glad to say, is held by U.S. Steel's Gary Works.

My point, of course, is the one expressed in that familiar slogan, "Safety Is No Accident." Creating safe working conditions in a manufacturing plant, and developing positive attitudes toward safety among employees, does not just happen; it must be a deliberate, well-planned and long-range program of selling safety by management, union representatives, and all employees.

The best opportunities for progress and the successful elimination of injuries lie in an approach that goes directly to the source of such progress and success. First, of course, it requires that management be "sold" on safety—and we are. It is generally agreed that safety is and must be a management responsibility, while the ultimate suc-

cess of our safety effort depends on the full cooperation of each individual employee.

One of the factors behind the achievements to date in industrial safety, and one that I know has long existed in steel, is recognition that safety cannot be divorced from day-to-day production operations. The terms "efficient operating practice" and "safe operating practice" are synonymous. By whatever measurement—from the standpoint of the moral obligation or reduced to dollars and cents—attempts at efficiency which violate accepted standards and practices of safety are not only wrong, they are self-defeating.

It is management's responsibility, therefore, to see that there is a safe working environment at all times. And when we talk of environment, we are talking about things that require management decisions and actions—expenditures for better and safer equipment, for correcting a newly discovered hazard, for making available protective equipment where it is required. It is likewise management's responsibility to see that safety rules and procedures are adequate and enforced—to see that effective training and education programs are developed and used to best advantage by all employees.

These are moral and legal responsibilities, and they cannot be delegated any more than we can delegate such other elements of business as product development, research, or a company's financial soundness.

In safety, of course, as in these other areas just mentioned, success depends upon the degree of cooperation management receives from all employees. Along similar lines, your next speaker will no doubt have some interesting facts to relate about a union-management safety effort in which he has participated. Certainly, the very nature and importance of safety suggest a mutual interest on the part of business, labor, and government in the effectiveness of injury prevention programs.

Incidentally, may I add one further point on this matter of good safety beginning with the use of safe equipment and manufacturing processes.

President Kennedy has referred on past occasions to what he called our "aging industrial plant." Also, Secretary Goldberg remarked, early last year, that there was at that time some \$75 billion to \$90 billion of our plant and equipment which is obsolete or rapidly becoming so.

This is an important point in safety, just as it is a critical factor in maintaining America's competitive position. Equipment that is rapidly wearing out, can sometimes generate safety hazards at an equally rapid pace. As every safety man knows, inefficiency in any

form can breed unsafe attitudes, just as it destroys the competitive ability of a plant or manufacturing operation.

At the same time, no company can keep ahead and plan ahead in the field of safety if its plans and actions are bound by a restrictive financial position. You cannot obtain for employees the fruits of the best in safety devices, the best in industrial safety brains and the safest machines, from a financially stunted tree, no matter how hard you shake it.

On the surface, therefore, it may appear to be far-fetched, but in reality, there is a very definite connection between better safety and a better means of stimulating capital investment in plant and equipment. They go hand in hand, and I am convinced that better attitudes toward investment and profit could be a major stimulus toward the better safety we all desire.

We learned long ago in steel and elsewhere in industry that safety-conditioning a plant with good equipment, eliminating hazards through sound engineering and providing adequate rules and training is only half the job. There must be implementation of the program by management with the full cooperation of every member of the company. This involves consistent actions, both in planning and in carrying out a company's efforts in safety, production, plant expansion, and the general progress that an efficient and competitive business must pursue.

The cooperation, in turn, must come from the employees, and there is probably no more crucial part of any safety effort than that of selling it to the men and women it is designed to benefit. Yet I know, as you people know, that it is frequently the most frustrating aspect as well. National figures show that upwards of 70 percent of industrial injuries are caused not by engineering oversights, but by unsafe work habits among employees.

How do we convince an employee, without resorting to the unwanted route of coercion, that the finest safety program in the world cannot guarantee him freedom from injury without his cooperation? How do we sustain his interest in protecting himself?

These are vital questions, not only in industrial safety, but also in creating safe attitudes at home and on the highway and everywhere our people go. American industry has naturally been a leading influence in the search for effective answers. And certainly the manner in which this experience has been shared in non-industrial areas is proof of industry's willingness to cooperate in the development of better attitudes toward safety everywhere in American life.

I could spend the balance of our time together listing the various techniques we have used in U.S. Steel, ranging from the participa-

tion of each employee in the development of safe methods of performing his job, to long-range promotional programs to create interest in safety on a broad basis. One of these efforts which may be familiar to you is a program called "Knowing's Not Enough." Since its introduction about 6 years ago, we estimate that several million people have seen the motion picture film which describes it, and hundreds of companies have made it a part of their own safety programs.

No one in industry, of course, claims to have found the complete answer, but we have learned a few key ingredients which help to make up the total solution. We know, for example, that any effort in safety must be a sincere effort. We know that, as in all our dealings with our people, there is no better policy in safety than one based on frankness.

And we have learned one thing more—an idea best expressed, perhaps, by the German writer and philosopher, Goethe, more than a century and a half ago.

The story is told that he was approached by a German youth who asked him to write some bit of profound advice in the young fellow's autograph album. Goethe hesitated for a moment, and then wrote, "Let everyone sweep in front of his own door and the whole world will be clean."

This is the essence of all progress in a free society. It is everyone pulling toward the same goal, everyone doing his share—not for the fame or the praise, but because the job has to be done. In industrial safety, it implies every company and every industry doing its separate job, meeting its specific responsibilities. It means every individual, whether he is a member of management or labor, business or government, selling safety on the job and off the job for one fundamental reason—because he sincerely believes in its importance.

When I was a boy, not yet in my 'teens, my father was brought home one day critically injured by a fall of top coal in the mine where he worked. For weeks his life hung in the balance, and life in our family came to a standstill. He did live, I'm glad to say, but for the remainder of his days, he walked with a pronounced limp.

From this incident, I learned in an unforgettable fashion of the tribulation and anxiety which come to a family whose breadwinner is struck down by a crippling accident. More important, it gave me a deeper understanding of the anguish and torment that are eliminated from American family life when people work safely.

Anyone here today who ever had a similar experience knows what I mean. And you will understand also, why benefit and compensation programs, regardless of how extensive they may be, are not and can

never be substitutes for effective and dedicated programs of injury elimination and employee cooperation.

There is only one really logical and effective approach to safety, and that is to sell everyone on its importance. There is only one way to eliminate the tragedy and the cost of injuries, and this is constant and diligent effort to attain that attainable goal of "frequency zero."

And there is only one way to make this objective a reality. That is by every member of management, every employee, doing his share in his particular area to improve safe conditions on the job until they can be improved no more.

A few years ago, as you may recall, a delegation of steel and iron ore people from the United States visited the Soviet Union to observe industry practices in that country. Being steel men, they naturally were conscious of safety, or the lack of it, in the Russian mills.

To quote very briefly from their report, their observations were phrased in such comments as "safety apparel was conspicuous by its absence" and, at another point, "the workers in general seem to take many chances that would be forbidden by plant safety rules in this country." I understand that other industrial delegations have reported similar conditions existing in other Soviet industries and areas of Russian life.

In contrast, here in our Nation's Capital, where one might feel that the pressure of national and international problems would preclude time being given to such everyday matters as safety, we find these Conferences being held, called by no less a personage than the President of the United States. You people, despite other responsibilities perhaps, have come from all over the Nation to devote time, attention, and ideas to the cause of safety—the safety of individual Americans.

This is one of the things that should make us proud to be Americans. It is vivid proof, if any is needed, of our national sincerity in considering the importance of the individual. I should hope that other branches of government—those responsible for telling the people of the world about the American way of life—will not overlook this Conference and its significance.

At the same time, I believe it is essential that we take careful note of this contrast ourselves. The American approach to safety has been one of voluntary action. Perhaps it can be said that we have come to realize that our ideals of life, liberty, and the pursuit of happiness require a pursuit of safety for our people as well. And if there is a single factor behind the progress we have made, I am convinced it is this understanding of the worth of the individual, this American principle which is the tap root of all our progress.

No one is ever really "sold" on safety, to my way of thinking, unless and until he begins from this basic premise. This is the ingredient that gives value and meaning to safety; it is that tie to reality which can give our efforts the mark of dedication.

The job of safety is a constant, never-ending job. It is, indeed, "everybody's job," as we are so often reminded, for safety involves us all and benefits us all.

And that is why these words are so important: "Let everyone sweep in front of his own door and the whole world will be clean." Let everyone approach safety from such a standpoint, and there will be no limit to the extent of our safety achievements.

This, I submit, is our challenge.

Joint Labor-Management Participation for Safety

AL. E. BROWN, *Secretary-Treasurer, United Papermakers and Paperworkers, AFL-CIO*

It is a pleasure and an honor to address you and to participate in this most worthwhile effort. It isn't often that I have an opportunity to talk with as large a group of people as this one who are dedicated to a common objective—that objective being safeguarding human worth. I doubt if any single person could be found in the free world who does not believe that the human being is the Nation's greatest asset; that human welfare is the concern of all; and that as human beings lead and enjoy better lives, they are more productive, and the security and the wealth of the Nation and the world is improved.

As I see it, the question which faces this group is, "How do we go about safeguarding human worth?" I am confident the engineers in the field of accident prevention have the necessary knowledge, formulas, and the know-how to make the home a safe place, how to drive on the highways and reach our destinations without becoming a statistic, how to design a plant and engineer a machine or a process so as to accomplish a zero frequency. However, we are still groping in the dark for the knowledge or formula of how to overcome the apathy of human beings in the area of self preservation.

Learned people tell us that once human attitudes are bent in any given direction, success in reaching a given objective is almost certain. In other words, acceptance of a cooperative willingness to work together would accomplish the goal which we hope to attain. Our problem is how to get people to accept their responsibility to work as a team. When this is accomplished, we should expect the desired results. So to me, it is apparent that the only way this group can

hope to secure the desired result is by getting people to recognize the problem, accept their responsibility, and do something about it. After all, it is our individual and collective problem.

The common difficulty in all movements or crusades is getting people to act. Now, how do we get people to accept their responsibility and crusade with us? How do we gain cooperative effort? Certainly not by ordering, not by demanding, not by legislation, and not by threat; but by selling people that this crusade is extremely beneficial to them and their loved ones.

Now when I say, "Not by order and not by demand and not by legislation and not by threat," I can recall the people of this Nation were told that prohibition was good for them, and a law was passed. The telling was never accepted and the law was never accepted. Their refusal to accept prohibition spawned the greatest mass of racketeers, corrupt officials, big men, little people in every walk of life whose influence on our way of life still continues, although that law was repealed more than a quarter of a century ago.

Tough law enforcement in the field of highway travel by driver examinations, licensing, fines, jail sentences, withdrawal of the privilege of driving, high insurance rates, slogans, warnings, and threats have not solved our highway problem. Why? Because we have failed through the process of education to gain the acceptance of the rules and the cooperation of the driver and the pedestrian. Now this refusal of acceptance cannot be laid at the doorstep of the nonconformist or the 10 percent or less of the population who are credited with being lawless by nature, but to every segment of society—the noneducated, the educated, the laborer, the craftsman, the doctor, the lawyer, the public official, the politician, the law maker, the industrialist, and yes, even the men of the cloth. Read your papers, the proof is there.

I would come to the following conclusions based on the many words that have been written and said and on my own experience—the people themselves must be convinced that they have a problem, that they can help to solve their problem, that they must work as a team. Then provide them with the necessary information and guidance to solve this their problem.

The key here is to get recognition of the problem, then secure public cooperation tied in with the know-how that the technicians of accident prevention have, and then act as a team. Now, let us recognize one thing here—if people are going to be part of a team, they are going to have something to say about how that team is going to play.

In any given group of people, there are a number who have hidden abilities which make them capable of being leaders, they also may have a desire to display or put to work these abilities—abilities which lie

dormant and only need the opportunity of awakening. Our job—uncover and exploit to their advantage and to the advantage of all. These people, through religious, social, or work activities, make and have contacts and opportunities to crusade and promote which you, as leaders, do not have. This group is the nucleus through which we must work. Their newly acquired opportunity of self-expression and leadership abilities will give them the incentive and desire to talk about that which you and I believe in. Cooperatively working and planning, the results of the efforts of the bottom and the top will soon be felt and the job which you alone set out to do will soon be on its way to being done.

I suppose that by now you have guessed the formula which I and many others have proposed for a successful effort—cooperation, joint effort, joint planning of all levels.

I suppose some of you people are setting your jaws, stiffening your muscles and turning your hearing aids off—but wait. Don't turn off your receiving apparatus until you have heard a true story about a successful, cooperative, accident-prevention effort which can be documented.

Some management, with dignity, but without any real self assurance, hides behind a term common to labor—jurisdiction—only they say “management's right” or “management's prerogative,” which, when applied to your effort, says safety or accident prevention programs are a responsibility of management, and any course of action to be taken is on the basis of decisions to be made by management without the need of employee assistance or cooperation. We will tell our employees what to do, and if they don't, they know what will happen. Well, what usually happens? An uncooperative resistance immediately arises when people are told. What happens to the team?

Back in 1945, at one of our industry-wide pulp and paper labor negotiations affecting approximately 20,000 employees located in the States of Washington, Oregon, and California, the unions had on their agenda for bargaining a request for safety conferences in an effort to reduce the accident frequency then in existence. The employers in that conference were progressive, thinking statesmen willing to take a step which, in the opinion of a few, would lead to disaster. As a result of this constructive pioneer thinking, an agreement was reached that the unions and management would hold their first joint labor and management safety conference in 1946—the conference to be jointly planned and jointly conducted. Since that year, 41 conferences have been held—some within States and some on the basis of the three States participating. Shortly afterwards, this program was instituted in the pulp and paper industry in the Province of British Columbia, Canada.

Necessarily, in a venture such as this, good planning is important, and good planning was exercised. The unions and the companies concluded that certain safeguards had to be stipulated so as to avoid the conference turning into a blown-up grievance meeting. The most important stipulations were: (1) That a committee composed of management and labor would determine the program for each individual conference. Incidentally, I sat in on most of the planning and I never saw a time when management and labor were solidly split on any issue under discussion. (2) That at each business session there would be two chairmen—one from labor and one from management, each chosen by his own group, who would act as co-chairmen. The real secret of success of this venture is contained in the statement of principle agreed to by both groups:

“The consideration of safety education, accident prevention and first-aid.

“The conference is not intended to be a sounding board for the settlement of local plant disputes or grievances. The conference is intended to bring out ideas and suggestions which may be used by the delegates in improving plant safety programs and making them more effective for the prevention of industrial accidents. The program has been formulated so as to encourage full delegate participation. All delegates are urged to join in the deliberations in the discussion periods. The success of the conference will depend upon your participation.”

As you will note, they, the workers, were included.

Well, you have heard what the program was and is. Now, what has been accomplished through this joint venture?

In 1945, the average frequency rate for all mills was 38.99, and in 1960, 4.66. Over a period of 15 years, there were only 3 years that did not show a downward trend. These years show only a slight increase over the previous year. The real improvement in the frequency was during the first 4 years of the program when it was reduced to 14.93.

I would like to remind you that over this 15-year period, a number of new mills were added to the bargaining unit—and many new employees—so the total man-hours worked were much greater. It has been estimated that had the program not been instituted in 1946, and on the assumption that the frequency rate would have been identical, we would have had 1,783 disabling injuries in 1960 instead of the 214 we did have.

I would caution you against taking a negative attitude concerning this program, thinking that perhaps the reporting by the various mills is not accurate. Let me assure you that Sid Grimes, Managing Direc-

tor of the Pacific Coast Association of Pulp and Paper Manufacturers, at one time an active member of one of the brotherhoods, would never permit it. Further, reports are published. The companies are desirous of making accurate reports, because each plant is under a different management, and, in many instances, a company has more than one plant.

Further, top management has said: If we improve our frequency, we want to know; if we don't, we also want to know. Accidents cost money and cause human suffering. We want to save money and we want to eliminate human suffering. The unions say: We want the money that would be spent on workmen's compensation put in our pay checks, and we want to avoid human suffering. We'd rather go fishing in front of an outboard motor purchased with the money that would have gone to workmen's compensation than lie in a hospital bed drawing workmen's compensation.

Now, I would like to mention the two international unions involved in this experiment in cooperative effort within the pulp and paper industry of the West Coast—the United Papermakers and Paperworkers and the International Brotherhood of Pulp, Sulphite and Paper Mill Workers—two rugged rank-and-file organizations. Tough, persistent, hard-working—but realistic, understanding negotiators who through their efforts have avoided a lot of human misery and work stoppages in this particular segment of the industry over a period of 26 years; yet proud of an excellent labor contract with the highest wage schedules in the world.

The reason for these accomplishments, mutual trust, with recognition being given to the following: workers are entitled to just compensation for their contribution; the stockholder in the venture is entitled to his just share; and with the final conclusion that one cannot prosper at the expense or detriment of the other, and that cooperative effort pays off.

One employer, a number of years ago, stated—and this is not a quote—that the safety of the employee should be placed on the same level as quantity of production. This has been restated many times, and once the production supervisor understands that this is the policy of top management of his company, the job is well on its way to being done.

Last year, at our annual wage conference, the unions requested that a joint review be made of our safety program to determine if some better and more effective method could be developed which would have the effect of producing a zero frequency. The employers agreed to this, and the two unions and the many managements have had several conferences and have developed a new joint program which is being submitted to the principals for consideration. It is possible that the

program developed in 1946 will be different from the program in 1963—in all respects but one, and that is cooperative effort.

Full Employment of Our Safety Know-How

HOWARD PYLE, *President, National Safety Council*

As we reach the closing moments of this eighth biennial meeting of the President's Conference on Occupational Safety, the first of our final thoughts should most certainly be one of gratitude to the President of the United States.

In requesting Labor Secretary Arthur J. Goldberg to "continue and reenergize this voluntary association of management, labor, and government," President Kennedy has given the highest possible prestige to safety.

Responding to the President's wishes, Secretary Goldberg, and the many able persons associated with him, have put together an outstanding program—one that has been dedicated to the advancement of one of the most stimulating themes in the history of these conferences—"*Safeguarding Human Worth*."

When the final record of these years of our lives has been written for posterity, it is my humble opinion that this issue, and those related to it, will command a very great deal of the space.

The question will be—Who won?

Did the forces of authoritarian domination prevail?

Or did the champions of God's will for men, as so clearly set forth in that all-time best seller, The Bible, prove themselves worthy of the nobility of their cause?

Under the general heading of civic and domestic duties, the Book of Books says—"Honor all Men."

Thus the theme of this Conference—"Safeguarding Human Worth" probes the very heart of our reason for being.

Since the deliberations of this Conference began day before yesterday, several members of the National Safety Council staff have been participating in as many of the sessions as possible. Last night we met to review the course of the Conference in order that my remarks here this morning might be made with some knowledge of what has been going on.

Without exception those reporting did so with enthusiasm.

While the highlights are far too numerous to mention, you will understand my reasons for mentioning some of them.

It seems especially significant to me that the point has been made that *there is no point* in attempting to undertake any project unless you plan to do it safely.

Naturally the first objective in any case is to get the job done, and done well.

If it isn't done safely then failure is involved and this is no way to lay claim to a job well done.

The flights of the astronauts provide the best possible example.

Surely there could be little reason for undertaking a mission of this kind if it wasn't to be done safely.

Only a man in space can bring back the ultimate in knowledge.

Only a man in space can take over when the miracles of modern science fail as occurred in Colonel Glenn's fabulous flight.

What better proof could be needed for the fact that there is no substitute for the human touch when the situation demands it?

Hence the over-riding reasons for *Safeguarding Human Worth* in any activity in which human beings are engaged.

The third paragraph of President Kennedy's authorization of this Conference puts the emphasis exactly where it belongs.

"Regardless of the scope of modern research and development, safety is the primary purpose and most important product of today's scientist. This is a lesson I hope the Conference will inspire us all to learn and apply wherever people work or employ others."

From the sophistication of the ultimate in hazards—where mistakes are deadly for a certainty—this Conference has also addressed itself to off-the-job and nonwork accidents, as such. Here the consensus contributes this absolutely essential conclusion.

Full support must be given to existing programs.

An important session of the Conference has been devoted to "Selling Safety Through Associations in the Trades and Services Industries." This is a fertile field for effective safety activity and a substantial amount of professional assistance is available for the best possible use of these channels.

The safety of the public employee has not been overlooked here. I, for one, am especially grateful for the emphasis that has been placed on this phase of accident prevention by the Secretary of Labor—Arthur Goldberg.

As a once-upon-a-time, long-ago campaigner in government—it behooves me to remind all concerned that efficiency and safety go hand in hand.

These factors have never been brought to management in government to the extent that they should be and can be.

Of solid significance is the work that has been done here on farm safety.

In this category the idea of *Safeguarding Human Worth* takes on special meaning because of the farming community's intense interest in the welfare of the family.

Increased efforts will be sponsored and suggested by this group and it goes without saying that we'll all do our best to help them.

There have been intensive discussions of:

The role of the schools in advancing worker safety;

Research in safety and its application;

Construction safety;

Materials handling in transportation.

The list of subjects that have been handled during this Conference is a real tribute to those who planned the program, and to the many whose participation has made the sessions lively forums of determination to do better by safety in the days ahead.

Although time will not permit a detailed review of the proceedings that have occupied you during the past 2 days, in covering the subject that has been assigned to me, I would like to lift this one thought from the discussion I am told took place in the Medico-Administrative Skills Workshop. I trust this is a fairly accurate statement of what was said—and I quote—

“Much can be achieved in the solution of present problems by intensive application of what we now know.”

I like that. It gives plenty of room for action now. I just can't agree with those who take the view that we don't know enough about accidents to do anything about them. We need to know more—that's for sure.

On the other hand, let's look at the church and its problems with human behavior. Its successes are innumerable. Still, its failures are heart-breaking. Even so—the *Ten Commandments* continue to stand as fundamental to moral law.

Never have the hazards to life in this world been more acute. Never have those who are responsible for safety carried heavier or more important burdens.

To be accidentally *killed* is to be the victim of an inadequate concern for human worth. To be accidentally *injured* is to be threatened with disability beyond repair—for the same reason.

This is fundamental. Other factors equally as fundamental to the success of safety can be listed.

This does not deny the complexity of our mission—but is it as complex as we sometimes think it is, and if so—what difference does it make?

We are told that in order to get our first astronaut—Commander Shepard—"Up there and back safely," approximately 1,200,000 checks were made on Project Mercury.

It was a beautiful performance—but on the same day hundreds of our finest citizens were killed accidentally at work, on our highways, in our homes, and public places.

On the big ones—we do great. It proves that we can.

On the job—the record speaks for itself.

Off the job and in the nonwork areas—perhaps a true story is the best way to make the point here.

It was once my privilege to moderate a fine lecture given by Mrs. Eleanor Roosevelt. Since there was to be a question-and-answer period after the main address, we took some time before the meeting convened to discuss things generally.

Among other things, Mrs. Roosevelt very graciously told me this story of an experience she had had during a London meeting, I believe it was, of the United Nations.

It seems that certain of the folks on our side—a considerable number, in fact—grew weary of the monotonous tactics of the opposition. So, they were failing to show up for continuations of the debates. As their numbers diminished sufficiently, and at strategic times, votes were called for and gradually the results were proving disastrous.

Finally, the folks on our side got together and in effect said—this has gone far enough.

So, on the next issue, they stayed and stayed and stayed.

When the vote came—the decision was a solid one for the West.

When the hub-bub died down, Mr. Vishinsky is said to have turned to Mrs. Roosevelt with this remark, "We didn't think you cared that much!"

Do we really care enough about safeguarding human worth?

Last year approximately 91,000 men, women, and children were killed accidentally.

Approximately 13,500 of these deaths were the result of occupational accidents.

True—the population death rate was the lowest in history.

What is more important, however, are such facts as these: Drinking drivers were involved in the deaths of about 10,000 persons. Speeds too fast for conditions contributed to the deaths of 10,000 of our good people. Smoking in bed took the lives of some 900 persons as a result of fires started by falling asleep while smoking. Boating accidents took the lives of 1,000 persons.

None of it makes sense, does it? Nor is this the whole story. The list is pitifully long.

The question everyone of us must answer is, "Are we making full use of our safety know-how?" Or, are we waiting for better answers—so-called—while we (not the Russians) bury thousands of the most precious possessions we have?

I doubt that there is a single person in this room who believes this waste is unavoidable.

Still, nearly 1,000 persons are killed every year as a result of injuries suffered while lifting things improperly.

Around 1,200 adults and children are killed each year while handling firearms in the home.

Stairway falls take the lives of approximately 2,300 persons a year in homes where adequate railings could mean safety.

Seat belts in use in every car could save 5,000 lives a year, perhaps more.

Surely there is nothing complicated, or mysterious, as to what is needed to stop these tragic losses.

If only we could have the same respect for the direct approach that is dramatized by this short, short story that I heard the other evening in Toledo.

A group of 10-year olds were being taught by a certain Sunday-School teacher.

The subject being discussed was *Hell* and the objective was to describe it in their own words.

Finally one little boy put it this way—

"Hell is where God ain't, and that's what burns you up."

Paraphrased—this amusing but fundamentally wise deduction gives us a line of truth that's worth remembering, *Accidents are where safety ain't, and that's what kills*—cripples—and, I hope, shocks us into realizing that there is no more important responsibility for us to put our hands and hearts to than "*Safeguarding Human Worth*."

The National Safety Council isn't worried about the trip to the moon.

They'll make it, eventually—and safely.

We *are* worried about the folks in your town—on the farms nearby—on your streets and highways—in your neighborhood—next door—and in the places of employment.

We *know* what accidents can do—and do do.

We know, too, that there are answers to the problems—not all the answers, to be sure, but those that can be used *now*.

Most of all we need a more universal application of tested safeguards—the things we know will work now.

In other words—full employment of our safety know-how—with everybody cooperating with everybody.

Should there be any doubt about where we begin; we begin with you and me, wherever we live and at whatever we are doing.

Should there be those who might lean toward the view that this isn't anything like the approach we need, perhaps it would be helpful to remember this about our latest national triumph.

The astronaut came from a little town in Ohio.

The space ship came from Missouri.

And Godspeed was on the lips of every American.

MR. REYNOLDS. Thank you very much Governor Pyle. It is quite obvious that Secretary Goldberg has been detained on the Hill much longer than anticipated. However, in anticipation of his arrival I had written a very brief note for him that says: "Mr. Secretary, be very brief. This is a wonderful audience. They are patient, kind, intelligent, but they are also hungry, and they want to go home."

As a closing note, may the Almighty God, who has so graciously and specially blessed our country, bless each of you with a safe trip home, and somehow or other because of our attendance here make each one of us a little more determined to make this country a little better, a little finer, and above all, a little safer. Thank you all.

Part V

Report to the President and to the Nation



Assistant Secretary of Labor James J. Reynolds presides as the "Report to the President and the Nation" is presented.

REPORT TO THE PRESIDENT AND TO THE NATION

Summaries and consensus developed in the workshops of the 1962 President's Conference on Occupational Safety

Recognizing that progress in the reduction of accidents had reached a plateau, and that some sectors of the economic life had lagged behind the headway made in manufacturing industries, the nine workshops of the 1962 President's Conference on Occupational Safety addressed themselves to those areas in which, it was believed, increased effort would be most fruitful.

The workshop on "The Role of the Schools in Advancing Worker Safety" was included because of the crucial role that the educational system plays in orienting future and adult workers in safety attitudes and safe methods of work. Similar workshops in previous President's Conferences had already demonstrated the energizing value that springs from focusing attention on the schools' role in safety.

The workshop on "Research in Safety and Its Application" sought to lay the groundwork for a breakthrough in the present accident frequency plateau by emphasizing what new knowledge we need, and how existing knowledge can best be disseminated.

A full-day workshop was devoted to "A Safer American Agriculture" in recognition of the many types of hazards inherent in agricultural operations, and the difficulties of organized programs in units where relatively few employees are normally employed.

A subject new to the President's Conference was "Safety in Materials Handling—Transportation" devoted to the safety of workers on the railroads and on the docks employed in transport of freight.

Lively interest was indicated by the conferees in the workshop on "Construction Safety"—another first in any President's Conference.

The growth of government activities dictated the arrangement of a workshop on "Safeguarding the Public Employee," dealing with the safety of over 8 million employees of governments at the local, county, State, and Federal levels.

Another new area was explored by the workshop on "Selling Safety Through Associations in the Trades and Services Industries," dealing with thousands of employers that can most practically be reached through their own associations.

While the general direction of the President's Conference is occupational safety, it was recognized that the need was to involve the whole man or woman, on or off the job. Consequently, a workshop on "Off-the-Job Safety" dealt with that vast majority of deaths and disabling injuries which occur at home, at play, or on the highways.

The growing importance of preventive health programs in contributing to a safer work force was explored by the workshop on "Safeguarding Human Worth Through Medico-Administrative Skills," dealing with the role of the industrial physician, the industrial nurse, the industrial hygienist, and related professions in achieving a safer work environment and a safer attitude on the part of all who work.

The high caliber of the workshop moderators and panelists, and the attention and obvious dedication of the conferees provides assurance that the information supplied, the needs identified, and the inspiration furnished by the President's Conference will be used to good advantage in the years to come in safeguarding human worth against avoidable waste.

Following are the summaries and conclusions reached by each of the workshops:

THE ROLE OF THE SCHOOLS IN ADVANCING WORKER SAFETY

A king-size problem facing the economy, as more young people annually join the work force, is how to meet the rising demand for skilled workers from a manpower pool so largely composed of inexperienced workers. And how to do it safely. Job injury rates have always jumped when large numbers of inexperienced workers were hired. This fact gives emphasis to the need for incorporating safety knowledges, skills, and attitudes as an integral part of job training. The schools have a moral and legal responsibility for the physical safety of ever larger numbers of students as enrollment continues to expand at all educational levels in all parts of the country.

The school's program for safety in addition to prevention of accidents in the school shop, should prepare students to be safe and efficient workers when they enter the industrial scene.

Industry has long recognized that a corporate safety program is based upon the attitude of management, union officials, and employees working toward a common objective. As for the individual worker, the first requisite is sound judgment developed and made meaningful by adequate safety training. Many accidents would be avoided if the

employee's know-how and first intuition to do the job safely had been obeyed.

When the worker ignores precautions that would protect and safeguard him from harm, he also ignores the contributing sorrows, suffering and frustrations which follow in the wake of accidents. Safety education programs will not be effective if "safety common sense" is not deeply implanted during the early years of youth.

The basic concepts brought out in the session as a result of the introductory statement of purpose, the inspirational statement of the school's posture, a presentation of challenging facts, the panel presentation of required action, and the audience participation were as follows:

1. The U.S. Office of Education was commended for establishing and conducting the 1959 Conference on School-Shop Safety. Every effort should be made to encourage implementation of the proposals developed at that Conference, one of which was the creation of a permanent body for implementing approved actions of the President's Conference.
2. The school safety recommendations made by the 1960 Conference were reaffirmed and given emphasis.
3. There is a pressing need for teacher training institutions to give a more prominent place to safety education in the preparation of shop teachers.
4. Safety conferences, keyed to the role that the schools can play in advancing worker safety, should be encouraged and conducted on a State level.
5. More information is needed on the type and nature of student injuries in the school shop. This information, to be adequate, will have to be collected and analyzed on a statewide basis. As a corollary to this, similar information on the injury experience of young workers in industry must be collected and analyzed. The combination of this information can then serve as the basis for an instruction program designed to produce safe and efficient workers in the future.
6. An effective safety program begins at the top. School boards should have written policies which define the administrative organization and instructional program in safety.
7. The importance of the shop teacher in implementing the school safety program was emphasized, particularly from the standpoint of analyzing shop practices and conditions and keeping constantly abreast of accident causes.
8. In underscoring the Conference theme for safeguarding human worth, the need was emphasized for developing good safety attitudes in tomorrow's workers.

RESEARCH IN SAFETY AND ITS APPLICATION

Conclusions and Recommendations

1. Safety engineer, industrial hygienist, engineering psychologist, and industrial physician, among others, have contributed greatly to occupational safety. However, the present magnitude of losses proves that much more needs to be done. In terms of the future, the challenge assumes additional aspects as a result of developments in automation and cybernation.

2. The overall problem, essentially, is a mismatch or lack of equilibrium between man and environment. Obviously, we must know more about man, machine, and environment before we can establish a harmony of function. But it must be recognized that machine and environment are secondary to man in importance; otherwise we shall create a health hazard, fail to safeguard human worth, and generally compound our problem.

3. Much effort will be conserved, much confusion avoided, much progress expedited, if we accept certain *axioms* of safe behavior and safety programing. We need to build on axioms as the fundamental sciences have done.

4. At the root of *any* accident will be found human factors of one kind or another—physiological, biochemical, psychological. They are meaningless, however, without reference to environmental considerations—the nature of the work, the nature of the work organization, and sheer physical or chemical aspects of the environment.

5. Given the “right” combination of human and environmental factors, an accident may ensue. Because of the role of chance, however, the consequence need not be injurious or even property-damaging. But the potential is always present.

6. Studying work accidents, therefore, is less profitable than studying work conditions (in the broad sense).

7. Fortunately most of these conditions, human and environmental, are modifiable or compensable. Correct or adjust these conditions and accidents will inevitably be reduced.

8. This prospect can be attained in large measure through new scientific approaches combining physiology and industrial engineering; and through emphasis on mental health and human relations, fields that are indispensable as long as work situations involve interpersonal relationships. In both these respects it needs to be recognized that health and safety are adversely affected by too much stress or too little. Healthy stress on the job may be accomplished through reasonable motivation of employees, through enlightened discipline, and through training in alertness.

9. The prime problem of communicating safety research findings to safety supervisors and administrators, as well as the task of communicating safety messages effectively to workers, can be greatly facilitated by observance of several basic principles:

Talk or write to a *specific* audience; consider the variety of their interests and educational backgrounds. The difference between an amateur and a professional in communication is that an amateur is message-centered, while a professional is audience-centered.

Bear in mind that people expect or want different things at different times.

Overestimate the intelligence of the audience, rather than underestimate it in your message. The former is likely to be nearer the truth; in any case feelings will not be offended if this approach is taken.

Rely as little as possible on formal communications. Personalize your message, even with a few penciled words on a scrap of paper.

Use human, everyday language as much as possible.

10. In the evaluation of safety programs as well as in research generally, accident frequency rates and accident severity rates are not sufficiently sensitive, stable, or representative criteria. What is needed is a measure of safety performance that does not depend upon accident involvement. Improper or inefficient work performance and near-accidents or critical incidents fall in this category. There is increasing evidence, too, that unsafe acts—regardless of the occurrence of accidents—are inconsistent with desirable production or service.

Some Needed Research

The following questions are among those that need to be answered if we are to better achieve our goal in accident prevention. They certainly do not represent the whole gamut of safety problems but are intended, rather, to give some idea of the breadth and depth of our field:

If bioelectrical monitoring and telemetric techniques can be so effective in reporting physiological and psychological data related to the performance and safety of an astronaut more than 100 miles in space, how can we use similar telemetric techniques to ascertain the characteristics of safe or optimum performance of a worker some 100 feet away in a warehouse, on a production line, or in a retail establishment?

What standards of "functional age," as distinguished from chronological age, can be established to determine fitness for work responsibilities and exposure to hazards in various categories of work?

What is the significance for safety of so-called "biological clocks" or biological rhythms in human function?

What variability can be built into work to help keep the operator of a machine alert to respond when situations begin to lead to an accident?

What individual susceptibilities and tolerances play an important role in determining whether exposures to categories of chemical and biological agents may result in injury?

Since atmospheric ions are considered to affect human behavior, under what conditions are they produced to a degree that may be harmful (or beneficial)?

How is the social character of specific jobs, or social cohesiveness on the job, significant for work performance and safety?

How do permissive and authoritarian types of supervision compare with respect to near-accident involvement of comparable work groups? How does size of work group affect the results?

What training or remedial measures are effective with employees whose "risk acceptance" is a result of self-confidence or attitude beyond their experience or reasonable standards?

What training should supervisors be given, and how, to help them spot indicators of potential accidents, such as unusual work errors or pronounced changes in everyday manners and habits? How far can management go in helping a disturbed employee?

How can exposure to hazard be better assessed as a means of assuring more dependable conclusions in accident research?

A SAFER AMERICAN AGRICULTURE

The annual accidental death toll among farmworkers is the highest of any occupation in the United States. The economic loss from farmwork accidents runs into millions. Significant technological advancements are taking place in agriculture, including farm mechanization, rapid expansion in the use of agricultural chemicals, and increased use of electrical power. Rural traffic patterns are increasing in complexity.

These facts make it imperative that agriculture vigorously increase its safety efforts on an enlightened basis. Current farm safety programs, projects, and activities have demonstrated a capacity to reduce farmwork accidents. These efforts must be expanded and increased.

The Agricultural Safety Workshop of the 1962 President's Conference on Occupational Safety presents the following as a consensus of recommendations for action:

1. *Research:* Lack of adequate information on farmwork accidents and limited research and practical application, especially in

engineering and environmental safeguards, are serious deterrents to effective farm accident prevention programs.

Recommendation:

(a) Clarify terminology and increase research and statistical services conducted cooperatively by the United States Department of Agriculture and State agricultural colleges, coordinated by National Conference for Farm Safety, National Safety Council.

(b) Expand the important role of the National Conference for Farm Safety in determining research and evaluation needs through research conferences with representation from the United States Department of Agriculture, State agricultural colleges, industry and allied interests.

(c) Encourage Federal and State agencies, private industry, foundations, and professional societies to provide adequate financial support for agricultural safety research.

2. *Education:* A major key to the reduction of farmwork accidents is an educational program to inform and motivate farm residents and farm employees to recognize, eliminate, and avoid hazardous conditions and follow safe practices.

Recommendation:

(a) Encourage employment of a minimum of one full-time farm safety specialist by the Extension Service of each State Land-Grant University to give leadership in planning and carrying out the program of State farm safety committees and their component organizations.

(b) Encourage employment of a minimum of one full-time farm safety specialist in Federal Extension Service of the U. S. Department of Agriculture.

(c) Encourage employment of additional farm safety specialists by farm organizations and allied groups.

(d) Encourage adoption of safety by farm organizations, agricultural agencies, and allied interests as a basic part of their educational programs, including those for farm women and rural youth.

(e) Encourage agricultural colleges to include safety courses for prospective educators in agricultural and home economics areas.

(f) Increase emphasis on safety in primary and secondary schools.

3. *Leadership:* The National Conference for Farm Safety, National Safety Council, has provided effective farm safety leadership during the past two decades, and is encouraged to expand its services to agriculture.

Recommendation:

(a) Seek increased cooperation and coordination, at the national level, of all agricultural groups and allied interests, through the

National Conference for Farm Safety, National Safety Council, to give agriculture greater unity and more effective participation in all fields of safety.

(b) Encourage agriculture and its allied interests to take immediate steps to provide expanded financial resources necessary for the National Conference for Farm Safety, National Safety Council, to carry out a program commensurate with the problem.

4. *Organization*: The present structure of State Farm Safety committees affiliated with the National Conference for Farm Safety, National Safety Council, provides an effective organization for coordinating the farm safety efforts of agriculture and allied groups.

Recommendation :

(a) Encourage further development and expansion of State farm safety committees with broader representation from farm organizations, agricultural agencies, and allied interests.

(b) Encourage the organization, where needed, of county committees to work with the State farm safety committee.

SAFETY IN MATERIALS HANDLING TRANSPORTATION

(Railroads and Stevedoring)

It might be said that while on the one hand, there is considerable variance in the accident prevention problems relating to materials handling in the various transportation industries, on the other hand they are basically and essentially similar.

The changes being brought about in the skills and abilities of workers, in the machinery, processes and methods of materials handling, and in some cases, the advent of new or different types of materials to be handled, requires not only more extensive application of the recommendations contained in already existing standards and suggestions for safe methods, but closer and continuing attention, acceptance, and application of improved methods to fit in with what might be termed the automated aspects of materials handling.

Great strides have been made in the utilization of electronics, new processes and materials, mechanization, and containerization of handling materials, and in many instances, improvement of manual handling procedures. Yet, as was brought out in sharp focus by the speakers participating in this Conference, there continues to be a need for considerable emphasis on the basic principles of accident prevention in the handling of materials in every industry.

Not only must a continuing effort be expended to develop new or improved methods and equipment in the transportation materials handling field to meet the demands of modern industrial life, but appropriate and adequate training of the workers who operate the equipment involved—or do the manual handling, as the case may be—will continue to be of basic importance.

Over 40 years of experience in accident prevention work has provided the knowledge that accidents can be prevented. This experience has been assembled in many forms. On the basis of this experience, coupled with the consensus of the panel members who discussed this subject, it could be said in brevity that the accident prevention problem presented by the handling of materials in the transportation industries narrows down to “the man and the machine.”

Stated differently, it could be said that, bearing in mind that efficiency and safety are inseparable—without the one, you cannot have the other—the challenge of the future as applied to materials handling in transportation is twofold. Machinery and equipment must continue to be improved in every possible manner. And the indispensable human element must likewise be educated in accident-preventing techniques. No matter to what degree materials handling may be mechanized, men will be needed to install, maintain, operate, and repair the equipment. It has long since been agreed that there is no such thing as a foolproof machine. Therefore, it may be concluded that since men will continue to be involved in both mechanical and manual materials handling operations, the essence of the accident prevention problem narrows down even more directly to people.

In accident prevention there is no substitute for a capable, safe employee. The foundation upon which to build for the future of accident prevention in materials handling in transportation then, is through training of the worker in safe methods, development of a safety consciousness and attitude in his mind, and encouraging him in every other practical and realistic way to enhance the efficiency of his work and at the same time protect himself from injury, by observing safe work methods.

Specific recommendations included:

1. More research on design and operational factors.
2. More fact-finding on accident causes, controls, and methods.
3. More labor-management cooperation in the form of committees and similar activities.
4. Dissemination of more knowledge on effects and controls of chemicals, mechanized equipment, standards for equipment and machines, and better testing procedures for certifying safe mechanized operations.

5. The need for more definitive laws and regulations and clarification of the jurisdiction of Federal, State, and other authorities.
6. Automation, mechanization, and containerization are not in themselves a panacea for safety. What is needed in addition is intelligent planning, engineering safeguards, preventive maintenance procedures, training, and re-training through improved cooperation and communication between labor and management.

CONSTRUCTION SAFETY

The first workshop session devoted to the construction industry in the history of the President's Conferences on Occupational Safety was established because of recognition of the fact that major personal injury problems in the 60's lie chiefly in the nonmanufacturing industries.

One of these, the construction industry, is the largest employer of labor in the country, having passed agriculture in this regard some time in the late 40's. Like agriculture, like mining, like lumbering, it does have an injury problem—and a serious one—but not an insurmountable one.

Construction safety problems differ from like problems in other industries in two major areas: 1. Each new contract is similar to starting a new company or setting up a new plant; 2. The duration of most contracts is insufficient to enable even the safety-minded contractor to train his work force adequately in safety.

Also, the construction industry is somewhat unique in that there are annually about 500 fatal injuries and several thousand disabling injuries to nonemployees. These are contractors, partners in contracting firms, members of family units, or individual entrepreneurs. The usual type of legislation requiring compliance by employers will therefore not reach these people.

Three panel speakers discussed various aspects of construction safety. For their detailed remarks, see *Workshop: Construction Safety*, p. 195.

A summary of the points brought out by the panelists may be summarized briefly as follows:

1. There are more similarities than dissimilarities between the problems of construction safety and those of other industries and the proven safety techniques of other industries are usable in construction safety.
2. Advanced planning for safety prior to the start of construction must originate at the top-management level and then must be implemented in the field by management representatives who

also have the responsibility of developing the foreman's interest in safety.

3. Training and education in safety at all levels is of prime importance. These include apprenticeship training, orientation sessions for craftsmen, and safety training for foremen.
4. The prime basis for accident prevention is and must remain humanitarian. Nevertheless, the recognition of the adverse effect of the costs of accidents, both indirect and direct involving both personnel and property, is of major import in securing for safety in construction the recognition it needs.
5. Many unions at the international level, but not always at the local level, have recognized their responsibility for safety through their participation in the general problems concerning the safety of their members. This has been evidenced by training programs sponsored by the international unions for their members and through direct participation in joint labor-management safety committees.
6. There is still need for safety legislation in States where little or none exists.
7. To pinpoint better the goals of safety efforts more injury data, particularly causation injury data, in construction is needed.
8. It is recognized that considerable progress has been made in accident prevention in construction, particularly by members of the larger trade associations. Much remains to be done and a way must be found to prepare ourselves for the challenge of the future. This can be accomplished through more active participation of the entire construction industry, including small contractors, both general and subcontractors, not members of trade associations.

PUBLIC EMPLOYEE SAFETY

With the growth of government functions and governmental employment, the magnitude of the accident prevention problem in public service has been increasing rapidly and today stands at a shockingly high level. It is essential that more statistical facts be made available to gauge the effectiveness of programs to prevent injuries in this sector. Such facts should reveal current problems and provide information on progress. The volume of disabling injuries has risen about 10 percent in Federal service since 1950; while employment rose 19 percent. The record for State and local government service is much worse. Here employment in 1961 was 60 percent higher than in 1950, but the volume of disabling injuries was 76 percent higher. A

few local jurisdictions show progress but relatively few programs have been put into effect.

One local community with a fine accident prevention program is Cleveland, Ohio. First, the facts were determined and then a program of safety engineering set up with the top administrative official (the Mayor) accepting responsibility. Major elements of the program include job placement, safety education, and enforcement of safety rules.

Government employment should be no more hazardous than employment in industry. Safety in government means tax dollars saved; but it means more—the prevention of injuries to employees on the job. The example of Cleveland might well be followed by other cities.

Turning to the county governments, there is a serious lack of measures to safeguard public employees. Of some 3,048 county governments in the United States, less than 10 percent have developed adequate safety programs. And yet, there is no reason to believe that the job-training methods used in industry would not also be effective if used by county governments. Again, as in other areas of public employment, such programs must be based on accident facts to guide the work.

Turning to the State level, the development of the excellent safety program for employees of the State of California was the outgrowth of special requests made during the 1950 Governor's Safety Conference in that State. Basic to the success of the California program are the statistics produced by the Division of Labor Statistics and Research of the State Industrial Commission. The State law requires that *all* disabling injuries—to non-Federal public employees and to employees in private industry—be reported. This provides a measure of the seriousness of the problem.

One facet of this work can best be told by using the traffic safety training program for the 20,000 vehicles operated by State employees. An intensive course was given and the safety instructions have proved their worth. Besides saving lives and property, improvement in the State's highway accident record has resulted in the State of California receiving a refund of \$123,000 from the insurance company.

Special safety instruction on the job was given to various other groups of State employees through safety workshops and detailed safety instructions. Examples of these are kitchen and restaurant workers, road construction and maintenance employees, to mention only a few. Private industry knows that safety pays—and just how much. Government should have the same kind of information as a basis for practical work and the application of technical knowledge.

Turning to the Federal Government, Federal safety activities are carried on generally within each Department. While there is room

for improvement, compensation statistics show that the injury frequency rate for most agencies has steadily declined since 1947. While general improvement is taking place, there is doubt whether top level officials are really interested, and whether they are kept adequately informed. The Federal Safety Council should do more to make certain that top Government officials understand the requirements of effective accident prevention programs. There should be a top level audit of every program to examine the soundness of the approach. There is also a very real need for coordinated action in the area of highway safety and motor vehicle safety. Few data are available to reflect the actual statistics of the more than 200,000 federally owned vehicles. The Federal Government needs to assault this program with vigor.

Employees and organized labor can be a powerful force in bringing about better accident prevention programs in all levels of governmental activities. This has been demonstrated in several areas where cities, counties, and States have developed such programs. Perhaps the tasks faced by employees and unions, other than the development of sound safety programs, have been given priority over this important area.

All branches of government are urged to enlist the safety services offered by the Bureau of Labor Standards of the U.S. Department of Labor. Safety must be a shared responsibility—the appropriate level of government, the affected employees, and the training agency. The contribution employees can make is an important one, and special measures should be taken to enlist their participation and support.

The following are recommended:

1. A stepped-up process of collecting and analyzing accident statistics by the U.S. Department of Labor and by appropriate local agencies;
2. The development of a master plan for accident prevention—such as that carried on in Cleveland, Ohio, the State of California, and other leading jurisdictions;
3. Development of training programs to promote safety and efficiency in various governmental operations;
4. Enlisting the aid of the several key associations of governmental units in creating interest through development of practical safety programs. Such organizations include (a) American Municipal Association, (b) U.S. Conference of Mayors, (c) The Organization of State Governments. Assistance can also be obtained from the U.S. Department of Labor, the National Safety Council, and many other organizations;
5. Participation of employees and of organized labor can make a great contribution to successful safety programs at all levels of government.

(All members of the Conference workshop panel who spoke on problems and recommended solutions have pledged their personal support in the development and execution of this program, which is set forth more fully in the complete papers presented at the workshop on Public Employee Safety. See p. 215.)

SELLING SAFETY THROUGH ASSOCIATIONS IN THE TRADES AND SERVICES INDUSTRIES

One of the panelists challenged the associations in the trades and services industries to bring about more favorable accident prevention experience through selling safety by way of membership service programs. He noted that the prevalence of many small business units imposed a special responsibility upon the association to provide a method for developing safety consciousness in the vast number of very small and widely scattered operations. He brought the extent and type of accident problem into focus and noted the critical importance of the association in guiding the membership, whether large, medium or small, into a program of accident prevention that will "safeguard human worth" and ultimately result in the saving of dollars for the safety-oriented company.

Against that background of facts and figures, the representative of the Hotel Association of New York City reviewed his association's successful safety program. He noted the role that may be played by the local safety council, or similar group, in cooperatively developing and extending safety to a communitywide membership.

He urged associations to explore this area as an especially worthwhile service to the association membership. His report emphasized their particular aim of instilling in the minds of every one of the members the conviction that accident prevention is just as important in their daily operations as any other phase of hotel activity.

He warned that the safety program must be long-term in nature. Too much should not be expected in the beginning; and the association management must have the purpose of aiding those who want or are willing to accept assistance. The reluctant and negative may be brought around as safety accomplishment becomes a matter of record.

In a similar report of the safety program at the national level, the representative of the American Hospital Association reviewed the development and extension of safety activities through the Hospital Association's Committee on Safety and the joint Hospital Safety Program of the American Hospital Association and the National Safety Council. He stated that it was their belief that the association provides an effective mechanism for meeting the constantly developing chal-

lenges of new hazards and problems relating to changing patterns of health care and technological advances in facilities, equipment, and techniques. Through the association one member's problem becomes the problem of all members and conversely one member's solution to a problem is available to all.

It was the consensus of the workshop that the association is an effective device for interpretation of safety to the trade and service establishments, no matter what its size.

The workshop recommends to the many trade and service associations that careful consideration be given to the development of safety as a membership service. The special attention of the association is called to the assistance that may be obtained through the Associations Division, National Safety Council; representative safety groups at the local level, whether State, county, or city in nature; cooperative safety service through local chambers of commerce; chapters of the American Society of Safety Engineers; Trade Association Unit, U.S. Department of Commerce; and the Trade Association Department of the Chamber of Commerce of the United States.

A special ally is to be found in the Trades and Services Department of the National Safety Council, where many association executives serve in a volunteer capacity on the executive committee and would be available for providing assistance based on practical experience in the application of safety to trade and service organizations.

Finally, the extent of the problem, with the complication of public liability and products liability added to that of employee accidents, dictates the need for greater participation in this critical area of "safeguarding human worth."

OFF-THE-JOB SAFETY

From the panel presentation and the audience discussion, it is apparent that business, labor, and all segments within a community, including the individual citizen, must take an active interest in off-the-job safety. Stimulus and discussion for this effort must come from the established leadership within the community.

Employer off-the-job safety programs carried on among employees and the programs conducted by unions for their members will continue to be vital to the success of a community safety movement.

To expedite the development of coordinated community safety activities, it is recommended that:

1. Full support be given to existing national and community safety programs.

2. Additional programs be developed to provide the spark needed to generate effective community accident prevention activities.
3. Safety leaders should promote community programs, provide or secure the technical direction they need, and accept leadership roles as the opportunities arise.

SAFEGUARDING HUMAN WORTH THROUGH MEDICO-ADMINISTRATIVE SKILLS

The panel gave attention to three general propositions which had been posed by the late Dr. A. G. Kammer for its consideration. These propositions were:

1. Much can be achieved in the solution of present problems by intensive application of what we now know.
2. We probably can solve a sizable fraction of future problems by intensive application of what we now know.
3. Some future problems can be solved only if we develop new methods through successful research.

Each member of the panel emphasized as basic to a successful health and safety program genuine cooperation among the several disciplines involved.

Many small industries which cannot independently support a program of health and safety services have developed partnership arrangements which jointly support these services. The panel urged that this type of partnership be encouraged and extended. To attain this objective will require that the management of small industries be convinced that the program is worth while by some value standard.

Much that is already known about man-job relationships is not now being effectively applied. For example, there is no reason now for the occurrence of such conditions as silicosis, lead poisoning, heat stress, and many chemical intoxications, yet those conditions continue to occur.

The panel enumerated some future problems which can be solved only if new methods are developed through successful research. They were:

1. The number of new chemicals being developed for use in industry and in the home is increasing so rapidly that their hazard to man cannot adequately be defined by present toxicologic research methods. It will be necessary to develop new screening methods and new shortcuts to toxicological research to avoid flooding the country with chemicals of unevaluated toxicity.

2. The unmistakable trend is to be concerned with lesser and lesser degrees of hazard. In many cases the limit of detection of overt changes has already been reached and work has begun on the development of biochemical, immunological and neurological techniques which will detect earlier changes in body physiology. In addition use must be made of statistical techniques which take advantage of group response to exposure as a more sensitive and reliable indicator of change.
3. An increasing number of agents are being identified as producing long-range, chronic, carcinogenic, or genetic effects. Increased emphasis must be placed on the study of these materials so as to distinguish between insignificant minute quantities, elimination of which would be unjustified, and significant quantities exposure to which would subject our industrial population to unsuspected risk.
4. Accidents involving the increasingly important human factor will not be prevented by conventional engineering approaches. Greater emphasis must be placed on a new field of specialization called "human factors engineering" to develop the principles and laws governing the man-machine complex. Psychologists, anthropologists, physiologists, epidemiologists, and biostatisticians must team up with the safety engineer and the industrial physician and bring their talents to bear on those new safety problems which our burgeoning automated society is imposing on us.

In commenting on the need for research, the panel expressed the view that methodologies previously used in studying causation and distribution of disease should be equally rewarding if applied to the study of the accident phenomenon.

Emphasis was placed on the great importance of top management's identifying itself with the health and safety program, thus lending the strength of its support to all levels of supervision as well as to the entire team of health and safety workers.

Part VI

Simultaneous Workshop Sessions



Dr. Leon Brody, Moderator of Workshop on Research in Safety and Its Application.

WORKSHOP: RESEARCH IN SAFETY AND ITS APPLICATION

Moderator: DR. LEON BRODY, Director of Research, Center for Safety Education, New York University

DR. BRODY. Some centuries ago Aristotle pointed out that not everything can be proved; otherwise the chain of proof would be endless. You have to begin somewhere, so you start with things readily admitted though generally undemonstrable. These are axioms. They are to be found in all sciences. They form the basis for the rigorous reasoning used in the development of modern mathematics.

We in safety work need to recognize pertinent axioms of safe behavior and safety programming . . . self-evident truths. And we need to build on these axioms as the fundamental sciences have built on theirs. To some extent we have done this, and out of the accumulation of experience, reasoning, and evidence, certain facts and opinions have filtered down. They are of this order:

1. Investigate *any* accident to determine its cause and it is inevitable that human factors of one kind or another—physiological, biochemical, psychological—will be found to have been involved.
2. These human factors are nevertheless meaningless, unreal, without reference to specific physical and social environments—that is to say, the nature of the work, the nature of the work organization, and “sheer” physical or chemical aspects of the environment.
3. Given the “right” combination of human factors and environmental conditions, an accident may ensue.
4. Chance has a great deal to do with the occurrence of the “effective” combination, and indeed with the consequence.
5. Because of the role of chance, the consequence need not be fatal, it need not be injurious, it need not even be property-damaging. But the potential therefor is always present.
6. As long as there is such potential, our primary concern lies with environmental conditions that are not right, with human conditions that are not right, whether or not they evidence any statistical correlation with accident involvement.

7. Studying work accidents, therefore, is less profitable than studying work conditions (in the broad sense).
8. Within certain limits most of these conditions—human and environmental—are modifiable or compensable.
9. In this context there can hardly be accident-prone people, as such. Rather there are accident-disposing conditions or circumstances.
10. Correct or adjust these conditions and accidents will inevitably be reduced.
11. Proper understanding and application of this new concept of “man-in-a-field” requires a systems approach.

As to which of these points are facts and which are opinions, that is to some extent a matter of opinion (at least in the minds of some of you, I am sure). In any case our axiomatic statements by no means leave us in mid-air. Reviewing the literature of research in the light of these statements, it is possible to come up with major conclusions of a practical sort. Here are three I consider rather important:

1. Physiology and industrial engineering can in combination produce relatively new scientific approaches in practical accident prevention. Some pioneering work has already been done along this line. The promise of the “man-in-a-field” system warrants extensive investigation.
2. As long as work situations involve inter-personal relationships, the fields of mental health and human relations have much to contribute to work productivity and safety. Although these fields at the present time are more or less subjective in nature and therefore tend to elude experimental control and quantification of data, there appear to be effective principles and procedures that merit wider application.
3. Underlying the two previous observations, and perhaps the single most important “tool” in all accident prevention, is *the concept of stress reaction*. Apparently both health and safety are adversely affected by too much stress or too little. The stressors may be physical, chemical, or social-psychological. And, of course, there are individual differences in tolerance. In any case, if for a given individual the stress is severe and prolonged, it tends to break down his body's adaptive resources. In moderate degree stress may have a preventive function—that of priming body systems to meet emergencies. Healthy stress on the job may be accomplished through reasonable motivation, including reasonable competition; through enlightened discipline; and through training in alertness. Of course, a psychologically healthy climate can prevail only in a physical environment that is conducive to safe and healthful work.

Having indicated in a very general way some of the dimensions of our *knowledge* of the accident phenomenon, may I now presume to suggest the dimensions of our *lack* of knowledge, by posing some questions that need to be answered by systematic study if we are to better achieve our goal in accident prevention. These questions certainly do not represent the whole gamut of safety problems. But I do believe that they give some idea of the breadth and depth of our field.

If bioelectrical monitoring and telemetric techniques can be so effective in reporting physiological and psychological data related to the performance and safety of an astronaut more than one hundred miles in space, how can *we* use similar telemetric techniques to ascertain the characteristics of safe or optimum performance of a worker some hundred feet away in a warehouse, on a production line, or in a retail establishment?

What standards of "functional age," as distinguished from chronological age, can be established to determine fitness for work responsibilities and exposure to hazards in various categories of work?

What is the significance for safety of so-called "biological clocks" or biological rhythms in human function?

How do causes of near-accidents compare with causes of reported accidents? How do workers having repeated near-accidents compare with other persons doing the same kinds of work without apparent involvement in near-accidents?

In view of some observed immediate relationships between physiological cost of work and high environmental temperature, high humidity, certain levels of noise, inadequate ventilation, and atmospheric contamination, what are the long-term or cumulative effects of such exposure? What job categories are particularly involved?

What individual susceptibilities and habits play an important role in determining whether exposures to categories of chemical and biological agents may result in injury?

Since atmospheric ions are considered to affect human behavior, under what conditions are they produced to a degree that may be harmful (or beneficial)? By what physiological mechanisms do these effects occur?

What types of jobs involve sudden physical stress conditions (or extreme changes in these conditions), and how do such circumstances affect the physiology and performance of the workers concerned?

How is the social character of specific jobs, or social cohesiveness on the job, significant for work performance and safety?

How do permissive and authoritarian types of supervision compare with respect to near-accident involvement of comparable work groups? How does size of work group affect the results?

Under what conditions and in what ways do safety competitions bring about a compulsion to act in a stressful manner?

What training should supervisors be given, and how, to help them spot indicators of potential accidents, such as unusual work errors or pronounced changes in everyday manners and habits? How far can management go in helping a disturbed employee?

What problem situations and sensitive questioning techniques can be developed to provide a reliable index of safety attitudes and thought processes?

What computer simulations can be developed for purposes of accident investigation?

What relationships are evidenced between undesirable production costs (in waste, machinery breakdown, etc.) and degree of unsafe behavior in work groups of varying size and function?

How can exposure to hazard be better assessed as a means of assuring more dependable conclusions in accident research?

Lest I lose some friends, let me emphasize that I am *not* posing these questions for our panel to answer. It is time, however, to hear what *they* have to say.

Research Needs in Occupational Safety

DR. THOMAS H. ROCKWELL, *Associate Professor, Industrial Engineering Department, Ohio State University*

Sometimes we gain object lessons from the stories we read our children. Today, an excerpt from *Alice in Wonderland* might properly introduce the subject I wish to discuss. Alice had just upset the jurors in the trial of the Knave of Hearts. He was the one who had stolen the tarts, you may recall. As soon as the jury had recovered from the shock of being upset, they set to work very diligently to write out a history of the accident. All except the lizard who sat with mouth agape gazing at the roof of the court. "What do you know about this business?" the king said to Alice. "Nothing," said Alice. "Nothing whatsoever?" persisted the king. "Nothing whatsoever," said Alice. "That's very important," the king said.

I see at least two morals in this part of the fairy tale. One is the fact that we have spent too much time reporting accidents and have not spent enough time, like our friend the lizard, in simple reflection on the real nature of accidents. The second moral, of course, is a little

more clearly illustrated by this story, although my point is slightly exaggerated. When Alice replied that she knew nothing whatever about the business, the king replied that "that was very important." I think it is very important that we realize we know surprisingly little about what causes accidents, the interaction of the human being and his environment, and the dynamics of accidents. The purpose of this presentation, today, is to show that we do need to know much more about accidents than we now know and that we must set to work with vigorous research efforts if we wish to close the knowledge gap in this field. Furthermore, we must begin to look at the accident problem from a production systems context emphasizing instead of avoiding the question of the relationship between safety and production.

From a research point of view, safety is a paradox. To a researcher the more experience one has in the laboratory or in the field, the better one is able to observe nature, construct and test theories, and understand the phenomenon he is observing. Despite the staggering toll of accidents in this country and the volumes of accident reports which accompany them, we seem to little understand what the accident phenomenon really is or how to prevent it. Why is it that so many infectious diseases have literally been conquered by medical science through research in a relatively short period of time, while accidents continue to occur at unjustifiable rates? I am afraid we live in almost the same state of ignorance about accidents today as in the pioneer days of the safety movement. Do we really understand the accident phenomenon? Do we have precise knowledge of causal interaction? Can we predict the success of an accident prevention program? In all honesty, I don't believe we have the answers to these simple, and yet extremely critical, questions. While one may argue that the conditions are not as dire as I would suggest, surely many in accident prevention acknowledge the lack of real understanding of accidents. As a researcher in this field, it is my responsibility to be sensitive to questions of knowledge since without it safety practitioners are handicapped.

While it is not the purpose of this paper to explain how, after 50 years of reporting accidents, we could admit to such little true understanding of them, a few factors are worth noting. It is the traditional function of research to delve into the unknown, to fill the gaps in our knowledge, to systematically study and relate appropriate phenomena. Yet the amount of research devoted to the problem of accidents is pitifully small. This is evidenced by a conspicuously small amount of financial support for research in this area. There have been too few individuals with capabilities for research who have been in-

terested in accidents. Paradoxically there exist several attitudinal postures among safety practitioners which inhibit the initiation of accident research. These include (a) the pessimistic view that we must always have accidents, (b) the narrow-minded view that accidents are not researchable because of the role of human behavior, or (c) the oversimplification of the problem by those who have a homespun panacea for all accidents, such as enforcement, education or preplacement. What is needed today is a complete re-orientation to the accident problem, the admission of our lack of knowledge, the encouragement of fundamental research programs, the employment of new research methodology to give us new insight into the problem of accidents, and finally the willingness to open our minds to different approaches to accident prevention.

An industrial engineer's view toward research is influenced by his role in industry and his orientation. An engineer is "control-oriented." This is to say, his prime interest is in the control of nature for the benefit of man. As Eric Walker, President of Pennsylvania State University put it recently, the engineer, not the scientist, is largely responsible for the house wherein our western civilization dwells. Communication, transportation, mass-production, automation, and labor saving devices are all examples of engineering achievements controlling forces for the benefit of man. Yet sometimes when we see how the house is abused by the tenants or when the tenants become victims of the house that they live in and suffer personal injuries, the engineer develops a sense of responsibility. Must we be prepared to accept human losses through accidents with industrialization? Is our control of nature's forces lacking? Have we failed to account for the man in the man-machine system? In the rush to build machines to serve man, I believe we have often forgotten that man must operate this equipment. Too often engineers assume that workers are endowed with the same reliability conformance and perfection that the engineer tries to build into his equipment. This was painfully evident in the early days of our industrialization when even the most elementary guards for power transmission equipment were lacking.

Because the design engineer failed to anticipate the vagaries of the human operator, and the interaction of man with his environment, safety engineering was first necessitated to correct unsafe conditions. For years, the safety engineer raced about putting out fires, trying to limit the blazes—hoping to control the accident problem. Now is the time for us to adopt a broader perspective of accident prevention. The man-machine systems of today are not as simple as they once were. Automation, new processes, new materials, and the complex

systems of the new technology make accident prevention research imperative if we are to avoid the failures of the past.

Thus to minimize accidents, we must be able to exercise control over them. This control takes place at four levels within the production system. Control exists with top management since decisions concerning allocation of company dollar and time resources to accident prevention must be made at this level. At the second level, decisions on the optimum use of this accident prevention allocation are the responsibility of middle management involving engineering, personnel, safety, medical, and maintenance functions. At the third level, front line supervision exercises vital control over accidents by applying the support and guidance provided by middle management to particular safety problems within a department. Last, but certainly not least, the operator himself must control his environment for his own personal safety.

One of the symptoms of the problem of accident prevention today is that we are asking the right questions at the right levels, but without hope for their resolution because of the lack of basic research. For example, the plant manager needs answers to such questions as: (1) What constitutes a reasonable accident prevention budget? (2) What can I expect to achieve with a given accident prevention expenditure? (3) Is there a given accident risk that must be accepted? When such questions are fielded by middle management, several difficulties arise. First of all, to answer these questions assumes that knowledge about the effectiveness of accident prevention measures on safety performance can be ascertained. Unfortunately, in the absence of concrete data, trial-and-error and horseback estimates must still be employed. At this level, decisions must be made on the proper allocation of accident prevention resources to get the most improvement in safety for the least cost. How does one do this? Will more inspections yield a greater payoff than a foremen's safety training program? Even more basically, what does safety performance mean and how can we effect changes in it?

Even when these decisions are made by middle management, the foreman is still not equipped to exercise the control over accidents that is uniquely his. Does he really understand how safety complements production? Is he equipped to note when psychological changes are occurring in his employees? Can he detect evidences of environmental stress? Can he provide the right motivational emphasis and leadership to his workers? Most important, can he be alert to the initiation of events which will lead to accidents? In like manner, can we expect the worker himself to appraise intelligently the safety requirements of his work, to note decrements in his own

skill and to detect unsafe changes in the environment when he is armed with only disciplinary threats, snappy slogans, and funny posters. To be sure "safety pays with happy days," but does this really give the worker any defense against an accident? One of my pet peeves, incidentally, is the traditional image of Joe Worker who is credited with little or no intelligence, who is even suspected of being against safety and who must be *made to be safe* by instruction, supervision or any other gimmick available. Those who make use of workers in participation programs, such as committee assignments, departmental observer programs and the like, can attest to relatively untapped capability here available for accident prevention. Yet, how can we make use of this tremendous force if all levels of management must operate in the absence of objective knowledge of accidents? Clichés and hindsight from past accidents are just not sufficient to meet the challenge of the present industrial technology.

Thus we have seen that the higher level questions lead to questions by middle and front line management—questions that can be answered only by going into fundamental accident research. One way to view the research needs in safety is by considering the area of questions that research must eventually be directed to answer. The broadest area of questions are those which top management asks. This is the level of systems control. It is at this level that the perennial problem of safety and production is a constant source of confusion. Related to this area, we have the problems of environmental and behavioral control of accidents and the measurement of safety performance. The third area of concern are the fundamental questions about the accident phenomenon and the environmental and behavioral factors in accident causation.

Figure 1 illustrates these three areas described above; namely, (a) the dynamics of the accident phenomenon and the environmental and behavioral factors in accident causation, (b) the effects of personnel and engineering control measures on safety performance and (c) the optimum control of production and safety at the systems level. Of course these are not distinct research areas, but rather overlap and interact with one another.

From figure 1 we can see that the distinction is made between operational research problems which are, for the most part, concerned with measurement and optimum control of safety performance and basic research problems concerned with understanding the nature of the accident phenomenon. These two different research areas require different approaches. One is concerned with the macroscopic aspect of accident prevention; that is the "big picture." The other is concerned with the microscopic view of accidents. The former is dependent upon the latter. At the fundamental level we need physio-

logical, psychological and engineering research techniques. At the operational level, we need systems research methodology to relate accident prevention resources to safety performance.

For purposes of illustration, let us examine some of our present research needs in the form of questions which beg answers with the present state of knowledge. Let us first look at a few pressing problems at the fundamental level. Figures 2, 3, and 4 illustrate some of my concerns here. Figure 2 poses just a few of the extremely simple yet evasive questions about the general nature of accidents. The notion of the temporal character of accidents has long intrigued the safety researcher. Is the accident the culmination of a long chain of events? Can these events be detected and reversed before they culminate in an accident? The terms unsafe act and unsafe condition have been used with remarkable familiarity, but can we scale or quantify relative degrees of unsafeness? The latter is surely necessary, for example, if we have to allocate limited inspection capabilities. Is it reasonable to say that one situation is two and a half times more unsafe than another? If so, this would have significant consequences in terms of operational control.

Figure 3 lists some of the behavioral factors in accident causation which have yet to be established. Without question this is the serious area of confusion in accident research. Much of the research in this area has been concentrated on the "accident prone" theory, a concept which has been generally shown to be invalid, at least in the classical sense of the term. It is unfortunate that so much of the psychological research in accidents has focused upon this facet of the problem. So many other problems are much more critical and offer greater results. These include the notion of operator risk acceptance* and the factors which influence it. Of equal promise is the concept of human channel capacity for informational inputs and decision making. Consider the two extreme driving situations, the freeway situation in which the driver is undertaxed in terms of the use of his human senses, and the crowded city traffic situation where human senses become informationally saturated so that adequate response is impossible. In each of these situations we know that the accident potential is high. If each task had a specified information handling and decision-making requirement, and each person had a given information handling capacity for optimum performance (be this safety or production), then we would have an objective basis for matching operators to tasks. Another basic area of needed research is that involving the concept of alertness. Despite the fact that inattention

*Rockwell, T. H., Galbraith, F. D., & Center, D. H., *Risk Acceptance Research in Man-Machine Systems*, Bulletin No. 187, Engineering Experiment Station, Ohio State University, Columbus.

Figure 1. Pyramid of Needed Research in Occupational Accident Prevention

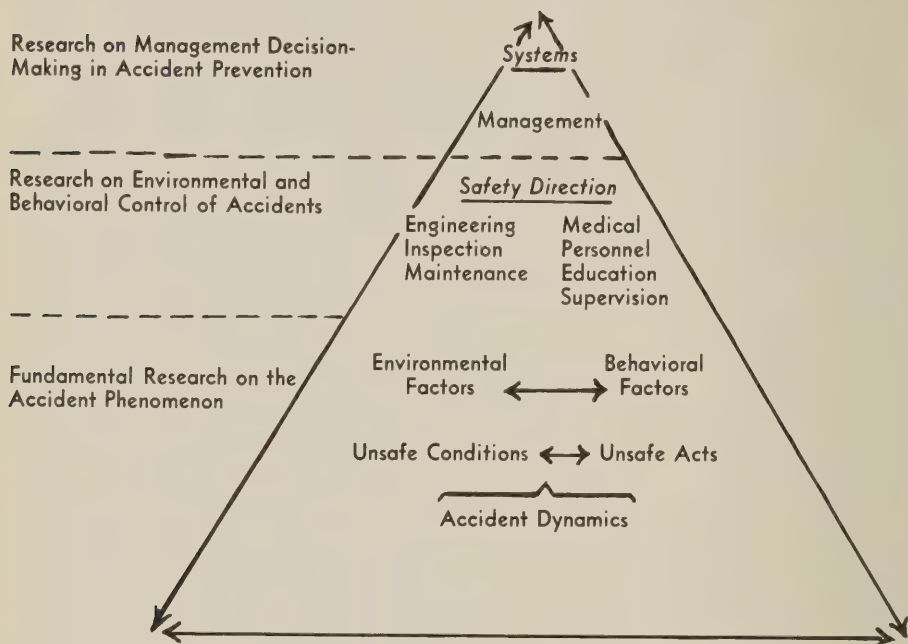


FIGURE 2. SOME REPRESENTATIVE FUNDAMENTAL RESEARCH QUESTIONS IN ACCIDENT CAUSATION—GENERAL

1. What distinguishes the injury accident from the near accident or no-injury accident? Are the latter useful predictors of the former?
2. Is an accident sequence a go-no-go situation, or does the accident cascade to an explosive point? Can an accident be structured in time sequences, and if so, are there reversible elements?
3. Are accidents probabilistic in nature and hence subject to the laws of chance? Or contrary-wise, is every accident unique in terms of its causation and its consequences?
4. How can we measure the unsafeness of an act or a condition? What does *safe* mean? Is this relevant to consequences or antecedent conditions?
5. What do we mean by the terms *risk* and *hazard*? Can these be scaled to permit statements of relative degrees of hazard and risk?
6. How are unsafe conditions and unsafe acts interrelated? Do unsafe acts breed unsafe conditions and vice-versa?
7. What is the role of compensatory behavior in accident progression?
8. Is it necessary to wait for accidents to occur in order to study them? Are there intermediate criteria, such as unsafe behavior, which are available and which lend themselves to statistical and scientific analysis?
9. What constitutes safe operator behavior? Is it necessary for us to understand what safe operator behavior is before we can talk about unsafe behavior?

FIGURE 3. SOME REPRESENTATIVE FUNDAMENTAL RESEARCH QUESTIONS IN
ACCIDENT CAUSATION—BEHAVIORAL FACTORS

1. What constitutes risk-taking in accidents? What are the personality correlates of high risk acceptance?
2. What do we mean by *the alert operator*? How do we measure this? Can alertness be regulated by procedural or engineering changes?
3. What constitutes a safety attitude? What are its determiners? Do attitudes precede or are they concurrent with accidents? How stable are attitudinal postures? To what extent do sociological pressures and cultural and economic backgrounds affect operator attitudes toward safety?
4. What is the effect of maturation on safety behavior?
5. What effect does fatigue have on sensory, motor and cognitive processes in the safe performance of a task? How is it manifested in operator behavior? Can it be detected at its outset?
6. What are the ranges of human tolerance to physical, biological and emotional stress? Can stress be quantified and can one measure an operator's response to stress?
7. What role does emotion play in accident causation? Can emotional cues which often precede unsafe acts be detected?
8. What is the relationship between physiological impairment (either temporary or permanent) and worker behavior?
9. What is *functional age* and how is it related to safety performance?
10. Does man have a channel capacity in terms of his ability to organize sensory inputs relative to the task? If so, can sensory or cognitive overload or underload lead to unsafe performance?

FIGURE 4. SOME REPRESENTATIVE FUNDAMENTAL RESEARCH QUESTIONS IN
ACCIDENT CAUSATION—ENVIRONMENTAL FACTORS

1. What are the safe acceptable limits of occupational hazards such as noise, toxic chemicals, temperature, etc.?
2. What are the dimensions of physical stress in the workplace?
3. Can we identify the sensory, motor and cognitive demands of a particular task on the operator?
4. How do unsafe conditions affect operator performance safety-wise?
5. To what extent does homogeneity built into a task facilitate or inhibit long term safety behavior?
6. How can innate and learned behavioral responses be utilized in equipment design?
7. Is it possible to design tasks and machines which provide positive protection and yet minimize restrictions on operator movements?

is ascribed to a large percentage of accidents, we are not in a position today even to define what we mean by inattention and the factors which influence it.

Figure 4 lists just a small sample of the research needs relative to environmental factors in accidents and occupational diseases. With almost one new industrial chemical being introduced each day, there is a greater need than ever before for toxicological research and data on human tolerance to such chemicals. The problem of task requirements in job safety is of particular interest to the industrial engineer. Traditionally, he has attempted through methods improvement to build standardization into work. Has this reduced the operator's information handling and decision-making requirements to a point where he becomes partially disengaged from his work by monotony and boredom? The concept of the worker as a simple automaton, unable to respond to changing conditions in a task or in the environment, is certainly a growing concern. Yet I am afraid that we may be making robots of many of our workers through the notion of standardization of task requirements. Perhaps the classical notion of *the one best* method is inimical to safety. Perhaps we have to build variability into work to keep the operator alert so that he can respond when situations begin to lead to an accident.

Figures 5 and 6 illustrate some of the research needs at the environmental and behavioral control level. It should be noted that these particular problems of research depend upon the results of the basic research questions which we have just mentioned. Of prime interest in research here is the need to first determine what we mean by "safety performance," second to measure the effect of accident control measures on this performance, and third to ascertain the timing and extent of accident prevention measures to optimize safety performance. This is the crux of the safety director's dilemma. Although mathematical models, such as dynamic programming techniques, are aptly suited to attack the third problem, the prime difficulty lies in establishing what constitutes safety effectiveness. Most of us in safety admit present measures such as injury frequency rates and injury severity rates are simply not stable, representative or sensitive criteria. What is needed is a more proximate measure of safety performance; that is, one which does not depend upon accident occurrences. Accidents are rare events when one considers worker exposure to accidents. Recent work* on using the percentage of unsafe acts as a measure of safety

*Rockwell, T. H., "Safety Performance Measurement," *Journal of Ind. Engr.*, January, 1959.

in plant production shows that the operators commit unsafe acts 15 percent of time observed, repeatedly exposing themselves to accidents. If this figure is at all realistic, then accidents may not be true measures of safety performance. There is a healthy re-awakening in the safety literature on this question of performance measurement which suggests that many recognize that the statistics we have been gathering with such great care in the past are, for the most part, inadequate.

FIGURE 5. SOME REPRESENTATIVE RESEARCH QUESTIONS ON THE CONTROL OF ENVIRONMENTAL AND BEHAVIORAL FACTORS IN ACCIDENT CAUSATION—BEHAVIORAL CONTROL

1. What constitutes plant safety performance? What constitutes individual operator safety performance?
2. How is safety performance influenced by: (a) training, (b) placement, (c) propaganda devices, (d) supervision, (e) job safety analysis?
3. How frequently must operator performance be inspected to insure compliance with safe practices?
4. Can an operator be trained to respond safely in emergency or stressful situations?
5. Can job requirements be quantified in terms of sensory, motor and cognitive informational handling capacities to permit matching men and machines to tasks? (See figure 4.)
6. What appeals are most effective in creating positive safety motivation?
7. What is the influence of supervision on individual operator safety performance? What kinds of supervisory characteristics are generally most effective?
8. What kinds of behavior should the supervisor be alert to in terms of predicting unsafe acts?
9. Where is the source of effective leadership in safety as far as the individual worker is concerned?

Human factors engineering is a facet of accident prevention research that offers more immediate payoff. In its simplest form it is the design of equipment and the environment for the human operator. Characteristically, engineers in the past have given little consideration to the operator in the design of work tasks and equipment. By consideration, I mean, with knowledge of human sensing capacities, motor skills and cognitive capabilities. Failure to make these considerations have led to many accidents. Engine lathes which require the operator to reach across the rotating spindle to turn the lathe off; forklift trucks with rear wheel steering, which, in backing maneuvers, are directly opposed to learned responses from automo-

bile driving; displays which are easily misread; controls which are easily misused (for example: faucets which close with counterclockwise movement) are just a few examples. As man-machine systems become more complex and operators become monitors of equipment, such human error producing design features become extremely dangerous. Although workers can be trained to operate poorly designed equipment safely, it is important to point out that when placed in a stressful situation human beings revert to their old learned responses.

FIGURE 6. SOME REPRESENTATIVE RESEARCH QUESTIONS ON THE CONTROL OF ENVIRONMENTAL AND BEHAVIORAL FACTORS IN ACCIDENT CAUSATION—CONTROL OF ENVIRONMENTAL FACTORS

1. How can we design equipment to offset operator shortcomings? Can we design task and equipment which minimize the probability of operator errors?
2. Can equipment be designed which will detect variability in operator performance and signal this information accordingly?
3. In job safety analysis, should variability be designed into the work?
4. How effective are inspections in maintaining safe conditions? Are there other methods such as the critical incident technique which are better at arriving at unsafe conditions than either accident reports or inspections?
5. How can we build safety into design without inhibiting the operator? Can we, in fact, free him of restriction of movement and at the same time provide maximum safety?
6. Can we specify environmental standards for safe and healthful work?

Human factors engineering involves design with the human being in mind, not despite him. This is an important distinction. Good and safe engineering design should seek to remove restrictions on behavior rather than add to them.

The most pragmatic research needs occur at the systems level which, as has been stressed earlier, necessitates answers to questions posed at the fundamental and control levels. Figure 7 is a sample of the key research problem areas. These questions are complex because they impinge on other decisions that must be made at the systems level. For example, with the many demands on corporate resources, what basis should be used to arrive at an optimum accident prevention budget? Is there a minimum level of risk that must be accepted in a firm? Does there exist a minimum level of effort in time and dollars to maintain this level of risk? Can we develop a cost scheme which

will truly give top management a reasonable estimate of accident costs. Can we develop some test which would relate production, quality and quantity to safety performance. Here I don't mean just accidents because I am convinced that *unsafe acts regardless of the occurrence of accidents are inconsistent with efficient production*. Accident prevention programs should be justified on this basis alone. At this level of decision making we need to know to what extent management should extend its accident prevention program to the off-work situation since it is well known that off-duty accidents result in more lost man-hours than occupational accidents. Finally, when does the organization have the assurance that control of accidents and unsafe practices exists? What measures can be provided to ascertain this level of control?

FIGURE 7. SOME REPRESENTATIVE RESEARCH QUESTIONS ON SYSTEMS CONTROL OF ACCIDENTS

1. What constitutes a reasonable accident prevention budget? What formulations should be used to arrive at this decision?
2. In terms of limited funds for accident prevention, how do we best allocate our resources and schedule their timing to effect the most benefit from them?
3. How can we relate quantity and quality of worker output to the percentage of unsafe acts? Is there a correlation between production efficiency and unsafe behavior aside from the costs associated with accidents?
4. How can management concern in accident prevention be best communicated throughout the organization?
5. How does management know when true control exists in accident prevention functions?
6. What constitutes acceptable risks for management to accept safety-wise?
7. How should management measure its safety performance? Are present cost formulations valid estimations of accident costs?
8. To what extent can off-job safety be integrated into a plant accident prevention program?
9. What constitutes an accident prevention program? How should it be integrated at all levels of management as well as on the shop floor?

When we examine this sample of questions, we naturally feel a bit uneasy. Can safety be as dismally backward as I have pictured it here? Have our successes in the past been merely the result of blind luck? I don't believe there is a clear answer to this question. Surely there are many accident preventionists who by special talents have reduced their individual accident rates and obtained satisfactory

answers to their own accident problems. Yet it is more realistic to state that those responsible for safety have often had to commit themselves to a resource allocation without being at all sure what the effects would be. It appears that unless we acknowledge that accidents are extremely complex phenomena and that they are amenable to research, we can never look forward to significant breakthroughs in accident prevention. I am convinced that answers to the questions posed in this paper can be developed through research. Homespun remedies, horseback estimates and wild trial-and-error will never lead us to the control of this critical problem today. Most of our research efforts are being directed toward the highway safety problem because here is where the funds are available. Industrial safety or occupational safety research, unfortunately, is the stepchild of the safety researcher.

Technological progress in the 20th century has always been preceded by fundamental research. We could cite medicine, automated production and space flight, to name just a few. Is there any reason to believe that by some osmosis we are going to get answers to the above questions or that if we forget them, they may disappear?

In conclusion, we need to employ new and powerful research techniques in accident prevention. We need seriously to attempt to qualify those old clichés that have led safety into a state of apathy in the past. We must attack the problem of accident prevention from a systems point of view. We must be wary of safety suboptimization; for example, putting our energies into specific parts of an accident prevention program (such as safety contests) to the detriment of the overall plant safety performance. We must think of safety not as a separate, often opposing, force in industry, but a function intimately tied to production and meaningless outside this frame of reference. We need, on a national level, an organization capable of providing research funds, capable of instilling the value of safety research in our research laboratories and on our campuses, raising the intellectual dignity of research on accidents, and attracting bright young researchers into this field. Of course this sounds very ambitious, but can we afford not to set our sights high at this stage of our development? Surely if safety research were given the amount of support proportional to the assistance that polio or cancer have received, we would doubtless not be in the position we are in today. Unlike Alice in Wonderland, we *would* be able to say that we *do know* something about this accident business and *it is very important*.

Some Aspects of the Role of the Life Sciences in Accident Prevention

WILLEM S. FREDERIK, M.D., *Lecturer on Physiology, Harvard School of Public Health*

Studying the preliminary program of the 1962 President's Conference on Occupational Safety, I noticed one subject matter which was of special interest to me. Here was the opportunity to meet a man who obviously had the courage and the knowledge to discuss in less than half an hour a subject of almost unlimited proportion. This scientist could be of great help to me by directing my uncertain steps towards a goal which, up to the present time, I could see only when optimism was prevailing over knowledge.

The name of the lecturer sounded familiar to me, but it still took me a measurable amount of time before I realized that it would be impossible for me to attend this revelation as a student, because I was the unfortunate lecturer myself. Dr. Brody made a blind-date for me, and see what I got.

I am certainly not planning to expose my lack of knowledge of vast areas of the subject, which, according to the program, I am supposed to cover. But, of necessity, I am therefore forced to take the liberty of retitling my paper, downgrading it to almost the level of my abilities. I deserve, however, the thanks of Dr. Brody for giving him the opportunity of devoting the next President's Conference on Occupational Safety entirely to all the aspects of the "Life Sciences in the Accident Phenomenon," which I did not cover in my presentation.

I would, however, like to talk about "Some Aspects of the Life Sciences in Loss Prevention Research," which significant limitation in subject matter lowers the level of this part of the program to an Assistant-Vice-President Conference on Occupational Safety.

With the subject of research in loss prevention, I feel somewhat more familiar, because I have had the privilege of founding and directing for almost a decade, the first research center of one of the largest casualty insurance companies in the United States.

Facing the challenging task of attacking a complex problem of which the chances of success are only a fraction of the chances of failure forces the applied scientist often to limit his activities to those areas in which he may expect some useful results. Further

directional forces in this type of research, as in all research, are obviously human abilities, experience, interests, opportunities, and prosaic items such as laboratory facilities and financial support.

Research under the direction of a physician-physiologist tends to show the influence of the life sciences in its approaches towards solving the problems of accident prevention. The environment (casualty insurance company) in which accident prevention research is performed may fundamentally restrict the scope of the research program, and consequently my coverage of this subject.

It seems to me practical to concentrate research activities on those areas which have proven time after time to be significant accident producers. These areas can be selected simply by studying national accident figures, or a casualty insurance company's statistics. A recent study made by a loss prevention department over a period of 2 years reveals *e.g.*, that 23.8 percent of all high-cost workmen's compensation accidents are related to manual materials handling and are responsible for about 20 percent of the total cost. These figures indicate the need for better understanding of causation of accidents as a result of pushing, pulling, lifting, bending, twisting, carrying, etc. If we include in our research the next important category of accident causes, "working surfaces," we are focusing some of our research activities to two areas that cost the community approximately 40 percent of the total amount paid for high cost compensable accidents. Further analysis of these statistics clearly shows the direction in which research on "materials handling" problems must proceed.

The following table shows this analysis of high cost workmen's compensation cases in some detail and confirms the previously made conclusions.

Categories	Number	Percent	Average cost per case	Percent of cost
Manual.....	1, 714	23. 8	\$5, 498	19. 7
Working surfaces.....	1, 654	22. 9	5, 710	19. 3
Machines.....	937	13. 0	6, 208	11. 9
Equipment.....	870	12. 1	7, 950	14. 5
Working conditions, noc.....	644	8. 9	7, 089	9. 3
Medical conditions.....	356	4. 9	7, 721	5. 3
Transportation.....	316	4. 4	11, 778	7. 8
Occupational disease.....	244	3. 4	7, 702	3. 9
Handtools.....	204	2. 8	5, 630	2. 3
Fire, explosion.....	108	1. 5	12, 419	2. 9
Electricity.....	85	1. 2	10, 635	1. 8
Elevators.....	49	. 7	8, 819	. 9
Noc.....	28	. 4	6, 265	. 4
Totals.....	7, 209	100. 0	6, 734	100. 0

The definitions of the most important categories are as follows:

1. *Manual (materials handling)*—all injuries allegedly or actually resulting from the lifting, carrying, pushing, or pulling of heavy objects including hand trucks of every type; all injuries from bending, twisting, or reaching in connection with the handling of materials; cuts from the handling of materials.

2. *Working surfaces*—falls, not elsewhere classified, due to defective condition or inherent hazard in the use of level or elevated working surfaces or to the failure or inability of the employee to walk, stand, or climb without falling.

3. *Machines*—all injuries resulting from contact with moving parts of machines, from objects thrown by or blown from machines, and injuries from the routine operation, cleaning, or servicing of machines.

4. *Equipment*—all injuries from being caught in, struck by, falling from, or being struck by objects falling from or knocked over by powered or manually operated, stationary or mobile, materials handling and construction equipment except hand trucks of all types.

The function of the life sciences in the most important categories is obvious, and further studies in the area of "manual materials handling" are indicated.

"Human engineering" in its broadest meaning, or to use the modern term "ergonomics," aims at the optimum use of the human being to serve the community and the individual in the best possible way. Ergonomics is the science which studies the "laws of work," emphasizing the capabilities and limitations of mankind physically as well as mentally. The industrial era has created an artificial environment-man relationship in which human beings are competing with machines. Technical developments are often so far advanced that the capabilities of the user, rather than the potentialities of his equipment, limit the performance of the two working together. Ergonomics considers not only the limitation of the man and machine working together but also the physical and chemical agents (noise, heat, radiation, and contaminants) created as a byproduct and serving often to limit production. Disregard for the human limitations results in an alarming number of fatalities and injuries caused by his own inventions. Because accident prevention is our goal, recognition of the pathological man-artificial environment relationship is paramount in order to undertake steps to cure the situation.

The industrial hygienist, safety engineer, industrial physiologist, industrial psychologist, industrial physician, traffic engineer, law maker, and gadgeteer, just to name a few, have in many instances devoted a lifetime to making the artificial environment a safe place

in which to live. However, the present magnitude of losses proves that much more ought to be done.

The problem is basically simple: we have obviously a mismatch between man and environment and we must do something about it to improve the situation. Ideally, we first must know man, machine, and environment before we can even try to match them. The modern approach to this problem is basically to adjust the machine or the artificial environment to man and not man to the machine or environment. The latter approach may be acceptable to the armed forces, where the human criteria out of necessity are different from peacetime standards. We, for example, can accept selection of astronauts capable of withstanding 30 g, but would no doubt refuse to accept an industrial situation in which the average working man would be exposed to these extreme stresses.

The artificial environment and the machine are secondary to man. Disregard for this basic human requirement will create a health hazard. Research, as I see it, must and can contribute in a significant way by gaining knowledge necessary for the application of the principles of ergonomics. Acceptance of the fact that better understanding of accident causation will result in better accident prevention, is of extreme importance to our society. The ultimate goal of research in ergonomics is the determination of work procedures, machine designs, and environmental controls that result in loss prevention. We must, therefore, think of practical plans for our research activities in order to accomplish this goal.

To illustrate briefly an approach which we found to be very promising, I would like to discuss the problem of "manual trucking."

Department stores and other establishments using floor trucks have reported many accidents related to floor-truck operation involving company personnel as well as the truck operator. Many of these accidents consist of falls, injuries to the legs, and back injuries of the truck operator. Injuries to the truck operator, such as back strains, could be prevented to a large extent, in our opinion, if we knew more about human capabilities and limitations in manual trucking.

Is it safe for the "average" man to handle a truck containing 1,000 pounds, or would this situation increase his chances of back injuries? Is pulling "safer" than pushing? What is the proper relationship between the slope of a ramp and the total weight of truck and load? These questions and many others are occupying the minds of many safety engineers because they believe, as we do, that a proper answer to these questions would decrease the number of accidents to the hand truck operator. In case of a collision, the sharp corners of the truck will sometimes cause serious injuries to employees or shoppers. These

collisions may be brought about by the operator losing control of his truck. A heavily loaded truck may increase speed on a downgrade, sometimes getting completely out of control. In other cases, trucks are piled high with supplies, limiting the operator's field of view. Play, carelessness, and other various human factors also add to the accident rate. Thus, it was obvious that the present truck design was very unsatisfactory from a safety point of view. New trucks were needed which would incorporate safety measures in order to reduce the frequency and severity of truck accidents, both to truck operator and bystanders.

The approach in solving this problem was twofold: (1) study of the "human factors" in manual trucking and (2) incorporation of safety factors in the design of the floor truck to reduce injuries to other persons than the trucker.

In the study of the "human factors" we limited our research to human efficiency measurements. One of the favorite tools of the physiologist interested in ergonomics is his equipment to measure metabolism. Because of the importance of this equipment, I have spent a good deal of time and effort in developing an instrument which will measure work efficiency more satisfactorily than most commercially available equipment. This instrument, called the "differential flamoxymeter" enables us to obtain an accurate, continuous determination of the oxygen concentration in gas mixtures, information basic to the evaluation of metabolism and human efficiency. Time does not permit discussion of the technical details of this instrument, nor its application.

This type of study reveals that the human efficiency for many industrial activities has an optimal value if the circumstances are selected correctly. This means that independent of the work output, certain environmental, design, or other factors influence the energy expenditure of men. Our goal is, therefore, to find situations in which man works at his top physiological efficiency or, in other words, expends the least amount of energy for his daily industrial work. This approach reduces fatigue, and also stress and injuries related to fatigue and stress.

The following conclusions are based on efficiency measurement of manual trucking: 1. Pushing is more efficient than pulling. 2. Pulling is recommended only in case of poor visibility due to bulky loads. 3. The optimal horizontal resistance of a hand truck in motion is approximately 32 pounds. 4. The best average height for the horizontal pushing bar of a hand truck is approximately 30 to 40 inches above floor level. The above information is very helpful in designing a manually operated truck so far as the effective use of the operator's

energy is concerned. However, as pointed out above, we are also concerned with the safety of the bystanders. Accident analyses indicate the need for (1) automatic brake, (2) elimination of sharp edges and splinters, and (3) provision of bumpers at ankle and hip height. Consideration of these factors resulted in the construction of the first experimental safety hand truck. It is provided with a bar-like handle at 40 inches from the floor level. The brake assembly is attached to the front wheels and connected to the handle by way of a lever. The handle is normally held upright by spring action. In this position, a brake is held firmly against the two front wheels by the same springs. When the handle is depressed, the lever is pivoted and pulls the brake away from the wheels, enabling the truck to be moved freely. But when the operator lets the truck go, the handle will swing up and the truck will come to an immediate stop. In addition to the brake, rubber bumpers also are provided, one at ankle height and the other at hip height. The rubber bumpers at hip height protrude a few inches farther than those at ankle height because it is the lesser of two evils to hit a person at hip height rather than at ankle height.

Much work has to be done in this field before we will notice the full effect of ergonomics on the reduction of losses. It is, however, my firm belief that ergonomics will be of great help to the army of safety experts in their battle against our mutual enemy—accidents.

The function of the life sciences in safety research is much more significant than my talk may suggest, and I would welcome the much needed help of my colleagues in the field of the life sciences to fully explore its potentialities in the area of safety research.

The Communication and Application of Research Findings

MILTON R. STERN, *Assistant Dean, Division of General Education and Extension Services, New York University*

When Dr. Brody asked me to speak today, he did what all sly, tricky moderators do. You know how they do it: First they imply that you know a great deal more than in fact you do about the subject; and then, when you have been seduced by this flattery, they hook you by adding that, after all, you know the field and it won't be any work—in short, "How To Succeed in Lecturing Without Really Trying."

Well, it worked, and I've spent days trying to develop a speech out of the enormous mass of material presented by the field of occupational safety. Let me say, without preamble, that you confront a much different problem in communication from almost any other group I can think of. Ultimately you ask not that a *few* human beings, but *ALL*, change or improve their way of life. Conventionally, advertisers or propagandists are happy if even a relatively small group follow their lead, buy the product. The advertiser is content with a "share of the market." But the key to communications in safety is that you want *everybody* to be different, or better. As far as I can tell, you can be content only by reaching and teaching 100 percent of your audience.

Even in adult education—my field—we don't seek to chalk up your record. My administrative assignment is in university continuing education and one of my jobs is to persuade people that they should continue to go to school, but I am content if 20,000 or so people a year respond. That is about all the students we can accommodate. These are drawn from a potential audience of some 15 million people in metropolitan New York. Even with other colleges and universities in the field, and community schools in the suburbs, no more than 15 percent of the adult population goes to school. You cannot be satisfied as easily—to you, every accident is a black mark. You have an enormously difficult job, I think, and as I've looked at the record, I can only say that I'm struck with how well it's been done. You attempt the continuous cultivation of an enduring attitude. In a dozen different ways and voices that command and shout and whisper and cajole you say, "Be careful." All the advertiser has to say is "Buy." If people do—why, then, success! But you? It goes much deeper.

Why should people be careful? True, they are all for being safe. They buy lots of insurance, but they drive like crazy. They deplore juvenile delinquency but they give their children cars to drive like crazy, if they can afford it—and they resent it if they can't afford it. Underneath the orderly world of men and women working in factory, office, or retail store is a chaos of drives, ambitions, neuroses, hungers, frustrations—in short, vast disorder. A basic question that occurs as we communicate and apply research is "What are our goals?" As far as I know, the best approach is the direct one of dealing with accident prevention *on* the job and reducing unsafe practices *on* the job. This is a limited, modest goal, but it's approachable. Granted that the large task may be to change peoples' attitudes in their whole lives, let us start with the obvious opportunity and expect that the rest will follow. This will be contribution enough.

Your concern is part of a much larger one, of course. The problem of communicating research findings—let alone applying them—has emerged as one of the largest trouble spots in the area of science and technology in our new age of automated work and leisure. Volumes, tomes, articles serious and frivolous have been written about the dimensions of communication. In December, Walter Sullivan, science writer for the *New York Times*, dealt admirably and clearly in two long articles with the problem of communicating research in all the sciences. Under the title, "How to Find Out What We Know," the *Times* editorialized on the problems that scientists have in keeping up with research. Let me quote its telling argument:

"A true story illustrates the kind of nightmare that occurs . . . in this field. About a decade ago several American companies here began seeking the solution to an important technical puzzle. Five years later the companies had spent several hundred thousand dollars in research on the matter but without full success. At that point it was discovered that in the very year the work began a complete solution to the problem had been published in an unclassified Soviet scientific magazine . . ."

And the *Times* went on to say, "The new science of information storage and retrieval which has been developed to meet this problem is, ironically, one of those in which the flow of reports is growing rapidly. Hence this science too is doing its modest bit to make the problem it is seeking to solve even less soluble."

The editorial concluded: "Today each major science is so vast and so interconnected with others that there has proliferated a vast number of subsiences whose practitioners often have little contact with each other. Thus today we have biochemistry and biophysics, physical chemistry and chemical physics, geobotany and mathematical

linguistics, to name a few of the many growing areas. Yet nature is a seamless whole, so that we must always be aware of the possibility that an obscure finding in one specialized field may be of major significance for another."

I am sure this is a familiar theme to you. Note, however, that the *Times* gave priority to the difficulty of communication between *scientist and scientist*. This is not the whole of the problem by any means—in fact, it is only the visible part of the iceberg. The editorial didn't get to *our* basic problem of communicating to the lay practitioner and the public. Even psychologists tend to look at that problem as if it were a bit grubby and *déclassé*. To discover how best to deal with "just people," we must depend to a great extent upon ourselves. We can try. True, there are problems of storage of research information, of relatedness of ideas.

But our basic concern is not translating from one scientific dialect into another, but into the common language of humanity.

Let me comment on one obvious activity and say that I am *not* going to deal with it. A great deal of communication in safety lies in the area of education. The teaching function, of course, is the basic communicative one. All of you, consciously and unconsciously, are teachers. But this is not the subject I am supposed to speak to, nor do I think it useful in the immediate context.

I wish to undertake, with some diffidence, to comment on the problem of *getting the attention* of the audience. Communication in this sense is at several removes from teaching and at the opposite pole from research. It will be persuasion, promotion, ideas from individual and social psychology that will be at the back of this talk. As I said at the outset, there is a vast mass of material, and to cover anything in a short time one must make a choice of a particular theme. There are many things one could stress, but I have chosen the matter of *audience* as central. In this connection it is *empathy* that I think important—the ability to put one's self into another person's mind and to think as he does, feel as he does, respond as he does. A friend of mine in the advertising business once gave me a profound and simple statement to express this. The difference between an amateur and a professional in communication, he said, is that *an amateur is message-centered, and a professional is audience-centered*.

Now you will readily see that, by the very nature of his work, a researcher in safety, as in any field of basic or applied science, is message-centered. He wants to give people the word—the message. He is in love with his work and is often puzzled that so many people couldn't care less. More than that, it is for this very reason that a

researcher is temperamentally unsuited to tell you how to communicate. Use the research, of course, as it applies authoritatively to human action and motivation, but the application must be in the light of the human behavior you know. The research must be translated for special audiences. Let me say here, incidentally, that we are concerned in this discussion with human applications, nonengineering applications. We need the warm-blooded give-and-take of everyday language and habits.

Let us try to develop an approach to what we may call—perhaps a bit grandiosely—a *theory of audience* that can serve practically in communicating and applying safety research findings. It has been expressed in general terms before, not quite as I am about to do, notably by publishing people thinking about selling books and magazines. For the moment let us think in terms of their market. They conceive of several audiences for reading matter arranged in concentric circles. In the center are the hard core, omnivorous readers, who buy books with the same passion that moves compulsive horse-players. They follow the book review sections as avidly as a tout sheet, have large charge accounts with their local bookshops, and can't walk through the National Airport buildings here in Washington without three or four paperbacks getting stuck to their coats. In the second circle from the center are the serious readers—only 2 or 3 books a week instead of 10—subscribers to the intellectual magazines like *Harpers* but not to the really intense ones like *Daedalus* or *The American Scholar*. Next out we have a larger group who look at the *New Yorker* occasionally, read 20 books a year, subscribe to the Book of the Month Club, enjoy *Esquire*, *Time*, and *McCall's*. And on the outer rim of this universe is the largest group—people whose reading life is bordered largely by *Life*, *Look*, and the *Reader's Digest* and who look at one or two books a year, maybe.

Of course, this has been an arbitrary and perhaps a bit hasty interpretation, but it is an original way of looking at some marketing information about audiences. I should add that this grouping of the reading publics does not include some tens of millions who belong to the largest book club of all—the Nonreaders Book Club, people who disappoint the publishers entirely. Yet this notion of concentric circles will help us, perhaps, to look at the audience you have to inform about safety. You, too, have several audiences with different degrees of interest in and sophistication about your message.

Think for a moment of yourself as both transmitter and *audience*. Surely you are in the center of the ring with the researchers in safety themselves. Your ideas come directly from researchers and from reports. For instance, what periodicals are your *must* reading?

Fairly esoteric ones, I think, for people like me who don't know the field. The *Journal of the American Society of Safety Engineers*, the *British Journal of Industrial Safety*, or even *Etudes. Recherches Psychologiques* and *Travail Humaine*, published in Paris.

Now let us try to chart your publics, place your audiences in concentric circles. With some diffidence and subject to your massive protest and revision, let me suggest that the second ring around you consists of management and labor executives concerned with the human and financial cost of accidents. Next out are supervisors, editors of company magazines, and labor publications. And on the outer rim are workers and their families.

Your special problems of communicating to the outer circle are pointed up by this parallel. While a publisher would be pleased to sell books Somewhere West of Laramie, out beyond Reader's Digest Country, he can pay dividends without doing so. But for you, it is mandatory to change attitudes among people at a far remove from your own and the researchers' intense concern with safety. Therefore it follows that *you* must develop as intensely—skills and ideas about communication. Let me say, that because you are not *selling* to your separate audiences, you have an advantage over the publisher trying to reach readers. In common with adult educators, but even more directly, you can use the each-one-teach-one technique to transmit your message. But the important point, of course, is to recognize that you must separate out your many publics.

Each of us will have his own version of this "theory of audience." One thing is sure, however: we cannot pass on research findings undiluted. We are like transformers, stepping down the current from heavy power lines, or like catalytic agents in the body, breaking down foodstuffs. But the process is neither automatic nor instinctive. We can talk until we're blue in the face, but the basic question remains, "Is anybody listening?"

Let me give a few specific points, by no means inclusive, as reminders of how to handle audience problems.

First point: *Talk or write to a specific audience.* The most difficult audience problem for a speaker (it is less visible but serious in written communication about safety, too) is the variety of educational and interest backgrounds. People don't laugh at the same jokes. People expect different things at different times.

One must cultivate *a sense of the appropriate.* Maurice Chevalier was quoted the other day as saying, "Many a man has fallen in love with a girl in a light so dim he would not have chosen a suit by it." So with communication. Let it be appropriate to your audience. That is obvious.

What may not be so obvious is that it is better—more polite and respectful of people, and sounder—to *overestimate their intelligence* rather than to underestimate. If you err, err on the side of thinking they are more—rather than less—sophisticated.

Point two: *Don't rely on formal communication. Be direct.* Communicating research findings and encouraging applications require novelty of expression. To get across new ideas, you just cannot rely on shopworn language.

Novelty—and research findings are new and strange—requires novel expression. Most of all, don't rely on officialese and gobbledegook to get across the message. The outstanding occupational disease of administration is surely constipated prose. Must I give examples? I'd rather not. This, I'm sure, is well-known territory. I would like to say only that often such language is really compulsive noncommunication.

My next point—point three is: *Be yourself.* Cultivate your own style, let it grow from your own personality and conviction. Practically this means, unless you're a consummate actor or salesman—don't use words or phrases that make you uncomfortable. Don't use methods that work wonderfully for Bob Hope or Mr. Red Motley—they probably won't do anything for you.

In communicating research in safety, it is better to be a person than a brand name. Be yourself.

Point four is related: *Promote—don't merely inform.* Let me say I don't mean, for the most part at least, the "hard sell." But there are certain techniques. The most important general advice is: *Personalize the message*—to individuals and from individuals. Try to be as *unmechanical* about this as possible. By mechanical, I mean, for example, a message from the president of a company reproduced in company publications saying elaborately in 500 well-chosen words, . . . "Don't slip on oily floors."

What about other personal steps? Handwritten notes in the pay envelope from *real* people. Ask 20 office employees to write out a 10-word sentence and sign it. Does that sound forced? Maybe so, but it will be read! Or—if you're the safety director, take the trouble yourself to handwrite a few dozen messages each week. This goes back to the advice not to rely on formal communication.

Indeed, in these days of overworked mimeograph machines, the pencilled note on a scrap of paper is more likely to be read than anything else. It seems more important.

If you use memo pads in your work, break their routine—meaning, change their size and color every once in a while, so that they remain *visible*. Next to *Moby Dick*, about the most unread kind of reading

matter I know is the standard memo. It gets to be invisible after a while. It is all very well and good in the safety field to induce people to obey invisible commands, those involved in the use of standard devices which they get to know and respect automatically. But *don't* standardize in the transmission of *new* information. And communicating research findings is *new*.

Point five is: *Study your audience*. As I say this, I think, how obvious it must seem. Yet I know how in the round of office activity, people, even people in your own organization who are the meaningful objects of what you have to say, vanish and become part of a faceless mass of people undifferentiated from those on subway or bus. How many of their faces do you remember? If you do not have a personal acquaintance with many of your own people, you are neglecting a necessary subjective research of your own in communications. There is no substitute for it. If you think you know what they are like, what their opinions are of company, of town in which they work, or your safety program, confirm your opinion. And don't be surprised if you change your mind after personal observation. This should be a continuing enterprise and a personal one. It can't be delegated beyond a certain point; it is important to see and hear for yourself.

This last practical suggestion regarding audience doesn't exhaust possibilities but it does exhaust the time at my disposal.

So far this talk has considered the dimension of the problem, has tried to point out differences between research and communication attitudes, has made some suggestions to get closer to audience, to understand it better and develop empathy as a professional characteristic.

My final consideration is one of the uncertain future. This is a problem workshop in a conference entitled—with great imagination, I believe—"Safeguarding Human Worth." Work in occupational safety may show spotty significant successes in rapidly automating industries where there will be fewer accidents because there will be fewer people working. But what about the whole population at work in the 1970's and 80's, most of them for few hours or—unemployed? And what about the changing pattern of employment from manufacturing to service industries? Even now, for example, it has been pointed out that the rate of accidents in the steel industry, in one geographical area at least, is less than that in 5-and-10-cent stores. The explanation given so far is useful but incomplete. It goes without saying that management and labor in steel have worked well together to achieve a praiseworthy result. But is it enough of an explanation that a better job of communicating safety was done? That motivation and interest was high in the steel industry while

nothing in particular was being done about that in the 5-and-10-cent stores? I am afraid not.

What has been left unsaid is that the value put on such employment by society and the related self-esteem of 5-and-10 employees is low. And so when they are packing glasses and china they don't pay attention and they cut themselves, or at least they break things. Is it possible, indeed, to give people in this and some other kinds of employment a higher sense of personal worth in their jobs? How? Here is a challenge for the country; it surely involves communication *and* research in occupational safety.

A high accident rate will be, I believe, a major symptom of that age of automation which is already gnawing at the self-esteem of millions of people who have been and are in process of being displaced by machines. How shall we communicate with people absorbed in their own troubles and made accident-prone by the circumstances of their lives?

The President said on February 14 that "we have to find over a 10-year period 25,000 new jobs every week (that is 13 million jobs in a decade) to take care of those who are displaced by machines and those who are coming into the labor market. . . . I regard it," he said, "as the major domestic challenge of the sixties—to maintain full employment at a time when automation is replacing man."

Other estimates of this displacement add another 5 million to the President's count. In any case, automation calls on all our capacity for social invention. What are the implications for accident prevention in an automated society, or to use the even newer word, a "cyber-nated" society? What happens to an individual's sense of his own human worth when machines can do not only mechanical tasks better—they've been doing that for years—but also can *think* better than he can? On what resources of spirit shall he call? How can one contemplate *leisure* in such a world? After all, things exist in terms of their opposite. In a workless world—as it will be for many millions—who will be able to speak of leisure meaningfully?

Will a workless world be a worthless world?

To a considerable extent, as we know, accidents happen out of boredom, which is essentially people's dissatisfaction with themselves. What will happen ten years from now when tensions may be expected to be of a more intense kind resulting from the varied frustrations of automation? But perhaps anticipation of troubles may help reduce them, if we use our wits. At least this should be the goal of what may be termed "preventive administration."

Here is my concluding point, a hopeful one.

Some days ago Colonel John Glenn was reported to have said that it was a great deal safer and more efficient to have human hands at the job in spacecraft.

Astronauts and Project Mercury engineers agreed with him. Dr. William Douglas, Colonel Glenn's physician put it this way: the principal lesson from the Glenn flight, he said, was to show that man "is a heck of a lot better than a black box of electronic equipment."

"Colonel Glenn," the doctor said, "showed that man can function in space, can display initiative in meeting the unexpected, can take over when the equipment fails and can do things that were not planned."

Here, then, is a major consequence of a great achievement by many thousands of men whose symbol is Colonel Glenn. If this is the lesson of space travel, why should it not be the lesson of man on earth?

New concepts and attitudes, profound changes will result from the rapidly developing relations between ever more uneasy human beings and ever more sophisticated machines. Clearly, a new role is in the process of formation for researchers in the field of safety. And it will be even more important than it is not for their findings to be translated into action and with great speed into the lives of all of us.

There is a new role for communications in the safety field. We must all assert our humanity in the face of perhaps the most ironic circumstance in history. In a symbiotic relationship with those machines which are both an instrument of freedom from toil and a threat of new psychological bondage, we must struggle to maintain our human ways. It seems to me that, you, of all professionals, are deeply involved in this awesome task.

In this sobering sense, for us, the generations now in command, ours is indeed a proud and exciting time in which to live. The message from space is "Let man take over." The challenge of the unknown future here on earth remains a challenge for the "Safeguarding of Human Worth."

WORKSHOP: A SAFER AMERICAN AGRICULTURE

*Moderator: W. B. WOOD, Director, Cooperative Extension Service in
Agriculture and Home Economics, Ohio State University*

SAFEGUARDING HUMAN WORTH ON AMERICAN FARMS

*DR. E. T. YORK, JR., Administrator, Federal Extension Service,
U.S. Department of Agriculture*

On behalf of Secretary Freeman and all of my colleagues, I want to welcome you to the Department of Agriculture. We wish you every success as you explore new avenues in farm safety education. And I assure you of our wholehearted support in working for a safer American agriculture.

It is especially fitting that this workshop on Safeguarding Human Worth on American Farms be held here. This year we are observing the centennial of the founding of the Department of Agriculture. When President Lincoln signed the legislation creating USDA, he referred to it as the "people's department." Since its beginning, this Department has been dedicated to serving people—not just our farm families, but all Americans. So it is appropriate that a workshop concerned with safeguarding human worth should meet in what has long been known as the "people's department."

Agriculture today is vastly different from the agriculture of 1862. Today farming is a highly mechanized, technical business. Through technological and scientific progress, the American farmer has become the most efficient producer of food and fiber the world has ever known.

Much of our agricultural progress has been brought about through mechanization, electrification, new chemicals, and other technical advances. These have enabled us to produce more and more food and fiber for a growing Nation with less and less manpower.

This morning I am not going to take time to discuss the significance to all Americans of our increasing ability to produce in abundance. Rather, I want to comment briefly on just one aspect of this technological revolution on our farms which is of immediate concern.



Assistant Secretary of Defense Stuart L. Pittman Discusses Civil Defense and Safety.

Mechanization and other technical advances have sharply increased the job hazards on our farms. Less than 10 percent of our labor force is engaged in agriculture. But in 1960 agriculture accounted for 15 percent of disabling injuries on the job. This single fact dramatically illustrates the urgency of controlling work hazards on the farm. And it brings into sharp focus the importance of your workshop here today.

The American farmer today has tremendous power to produce food and fiber. As he uses this power, he continually exposes himself to accidental injury or death. So it is imperative that we put forth our best efforts to help prevent accidents on the farm.

The best accident prevention, as you well know, is brought about through safety education. You know from experience how safety education programs effectively reduce accident rates. As leaders in these programs, you are to be congratulated for the progress being made.

But much more needs to be done. Since 1950 the farm accident death rate has been reduced from 66 to 55 per 100,000 people. We are closing this gap but not far enough nor fast enough.

High accident rates are costly in economic terms—in terms of time lost and similar factors. But of far greater importance is their high cost in shortening or snuffing out human lives. These are irretrievable losses which cannot be measured in dollars. And they are of deep concern to all of us.

You face several challenging tasks in your workshop. You are examining the progress being made in farm safety education—a look at where we have been. But even more important, you are looking to the future. You are helping to chart our future course in farm safety education.

Your program committee is to be commended for the thorough approach you are taking to this important task. You will begin by studying the facts—what research has shown us about farm safety and what further research is needed. You will study ways to put into practice what we already know about accident prevention—how to encourage farm families to use engineering and other safeguards which already exist.

You will have an opportunity to analyze ways we can more effectively use our educational resources. Many groups are concerned with farm safety education—State and national safety groups, the Cooperative Extension Service, Future Farmers of America, schools, farm organizations, industry, and others. All of these groups will, I am sure, welcome your suggestions on how we can better coordinate this important work.

And one of the biggest challenges you face is to suggest how we can organize for action—both for a long-time program and for emergency programs such as rural civil defense.

Throughout the workshop, you will be taking a broad look at farm safety and how we can work together to step up our educational efforts in this area. We in the Department of Agriculture are happy to be associated with you in this search for new and better methods to educate farm families in the why and how of safety.

I can assure you of the continued support and cooperation of all of us in “the people’s department” and especially that of the Cooperative Extension Service. Extension, the Department’s educational arm which reaches out to every county in rural America, has worked closely with you in the past in mutual safety education efforts. We pledge our continued cooperation in helping carry the safety message to farm families.

Working together, our educational efforts can indeed help safeguard human worth on American farms.

OUR SITUATION IN FARM SAFETY

EDWARD S. ADAMS, *Director of Safety, Iowa Farm Bureau Federation*

In recent years, accidents have claimed the lives of over 11,000 farm residents annually. Nearly a million others fortunately survive their yearly accidents, but sustain disabling injuries costing time, money, and suffering. Often, victims are left crippled—their handicaps unhappy reminders of a moment of carelessness or of ignoring the rules of safety. The cost to farm people exceeds a billion and a half dollars yearly. The number of farmwork fatalities leads all other occupational groups, and ranks third in rate on a man-hour basis. This doesn’t speak too well for agriculture’s safety record. And of great concern to rural leaders, 75 percent of all fatal traffic accidents—farm and city residents alike—occur on rural highways and roads.

I’m not here just to quote statistics. You know these figures. But I—as you—am here to find out what can be done to put a stop to this senseless slaughter and waste—what we as responsible leaders and citizens can further do to help save lives and preserve family integrity—what we as Americans representing agriculture can do to remove this cancer of accidents from our great farm community.

And we are making progress. It has been estimated that close to 1 million lives, countless injuries, and billions of dollars have been saved over the past 50 years because of individual and group volunteer

safety activities, and the professional work done by safety specialists in industry, government, and the National Safety Council.

Let us take a look at the changes in agriculture because this goes hand-in-hand with our considerations of the farm accident problem. Farming has been transformed rapidly from a relatively primitive, marginal subsistence occupation to a complex, mechanized, tremendously efficient business. The investment in farming is \$200 billion, or over \$21,000 per farm employee. Industry has an investment of \$5,000 less per worker, or roughly \$16,000. Four jobs in 10 in private industry are related to agriculture. Less than 8 percent of the work force is directly employed on the land.

A century ago, farming in America wasn't radically different nor was farm life much better than that of the medieval peasant—except, of course, the American was a free man. Farming was a thankless, laborious life of toil and the harvest was little more than was required to maintain the family.

American agriculture has undergone a revolution. Muscle power has been replaced by the infinitely greater capabilities of electricity and petroleum. Machines and tools equipping today's farms are fast, complex, and powerful. They do work in minutes that required a long day of human and animal sweat in times past. Blessings these are—but we haven't been left entirely free to enjoy them. They have brought accident hazards and problems of safety unknown to our grandfathers. New hazards are being created constantly, but most of the old hazards remain. No one today gets thrown out of buggies—but the perils of fire, livestock, accidental gunshot, drowning, falls, and so on plague us today just as they did the farms of Lincoln's time. With the advent of mechanization and rapid transport, the injuries sustained in accidents are more severe.

Part of this has been offset by excellent and prompt medical attention which was unavailable years ago. Many accident victims a hundred or even 25 years ago died or were crippled for life from injuries that now are survivable and can be repaired sufficiently to minimize handicap. Compared to others, the farmer is less advantageously situated to quickly receive in an emergency the life saving benefits of modern science. He is often injured in the field. He may be alone. And he may live many miles from a doctor or hospital. Bad weather could isolate him from what services are available. An injured factory worker receives treatment immediately. And usually the traffic victim gets medical attention more quickly than does the farm victim.

Another situation that has changed remarkably in the last 50 years is our whole concept of accidents and accident prevention. Throughout earlier years few men said accidents were usually caused by human

failure and could be prevented by people through foresight and planning. Accidents were generally accepted as another woe—a fact of life—a part of man's troubled fate. Some regarded mishaps as an act of God, or punishment for sins, and thus beyond the control of man.

Today, we know that accidents can be prevented—that things can be done to fight this age-old curse of civilization. We know that man himself is directly or indirectly responsible for perhaps 90 percent of his mishaps. Certainly, accidents occur that may not be preventable, even when all reasonable care is taken. Nature herself may conspire to cause accidents and sometimes mechanical apparatus fails suddenly and unpredictably. But again, accidents where all those involved are luckless victims of circumstance number about 1 in 10.

The lion's share of accidents are caused or agitated by some failing of man himself. Carelessness, apathy, anger, lack of responsibility, poor attitude, ignorance, oversight, lack of skill, incapacity, fatigue, or even pure destructive cussedness are common human factors that bring on mishaps. Poor maintenance and neglect of machines, buildings, electrical systems, automobiles, and so on lead to accidents that are often blamed on plain tough luck. Something a farmer puts off doing for safety now might kill him years later. Bad luck, they would say, but often the seeds of an accident were sown long ago.

I mentioned a few moments ago that agriculture has a mediocre safety record especially when compared to manufacturing. Let's compare the two for some of the differences:

- Factories have trained safety engineers. The individual farm operator is not trained in safety.
- Factory workers do about the same job daily. Farmers have a multitude of differing jobs requiring proficiency in several skills—proficiency that often is lacking.
- Working conditions are variable because of the whims of nature and weather.
- Farmers quite often work alone. If an accident occurs, help and medical attention may be unavailable or delayed. Factory workers get quick attention.
- Farmers work long days and many hours per week which means they are exposed to work hazards for a longer time. Too, they rarely take coffee breaks or stop periodically to rest and relax until fatigued.
- Farmers work with moving machines. Most factory workers operate stationary machines which are well protected and supervised to see that guards are in place and safety devices operative. Farmers also work with animals whose behavior is erratic.
- Farmers often work until after dark to finish a job. They are often exposed to the hazards of darkness and poor visibility. Farm equipment sometimes is moved on roads and highways at night.
- Farmers tend to be neglectful and careless, and often work with faulty, poorly maintained equipment. No one is there on the farm to supervise or to teach better habits.
- Industry began accident prevention programs in 1912, while little was done in farm safety until 1944.

No other occupation is similar to farming as to the type of work done, the work environment, and the number of different kinds of hazards. In a manufacturing company, one man or a few men can be reached who are responsible for the on-the-job safety of many persons. Close control can be exerted over the factory work environment, workers can be trained and operations may be closely supervised for maximum safety. Thus with relatively few basic contacts, the safety of millions of people can be influenced. In farm safety, the task is far more difficult because we must reach millions of individual farm families. A corporation may assume much responsibility for the safety of its employees and may have people skilled in executing safety programs. Employees may more or less be required to conform to safety regulations and often good safety habits formed on the job are carried into off-the-job activities. A farmer operates under no such regulation. None can make him do anything about safety on his farm except his own conscience and motivation. And that is the crucial area we in farm safety must reach.

Where are we today in farm safety? Much progress in reducing farm accidents has been made in the past 18 years since the National Safety Council established a specialized department to concern itself with farm safety. Increased effectiveness was assured by the organization in 1947 of the Farm Conference, a nationally represented body of outstanding leaders of agriculture and business with an interest in the safety of rural people. Together, broad farm safety programs are conceived and implemented. Forty-six State farm safety committees, hundreds of farm and business organizations, and thousands of volunteer persons and groups cooperate in promoting farm safety at the State and local levels. Rural youth groups such as 4-H and FFA have done a magnificent job in farm safety. The 4-H Safety Program, for example, enrolled nearly 800,000 young people last year in safety projects. In many communities, a lone person—maybe a county agent, maybe a businessman, maybe a 4-H'er—has gone out and aroused interest to organize some sort of communitywide safety campaign.

Very often, all a community needs is someone or some group to start the ball rolling. I wonder how many willing people are in our agricultural communities who would gladly and firmly take hold of the safety challenge if a tiny bit of encouragement could be supplied.

Our modern techniques of communications and media such as radio, TV, press, and farm publications offer excellent opportunities to contact the vast farm public with information. We are utilizing these channels, but perhaps not as well or as extensively as we might. We need fresh ideas and intelligent consideration to determine the most

effective ways of reaching farm people with the farm safety story through maximum employment of our media resources.

We are working toward a uniform, reliable, workable method of gathering accurate farm accident statistics. It is hoped that eventually we may be able to find out more about the whys and hows of accidents in addition to learning what happened and to whom. The National Institute for Farm Safety will soon address itself to this area, and I am confident that new ideas will be developed to effect an improvement.

The field of engineering has made great strides. Modern farm machinery is designed for safety provided the operator exercises reasonably common sense and care. Vehicles are safer and easier to operate. Roads are being improved and new highways are designed for maximum travel safety. We have advanced technically and have refined our knowledge of safety design to a degree that we can engineer good safety into most of the things we make or build. Manufacturers and builders are generally very concerned and aware of the vital importance of planning and designing safety into their products. They are seeking and sharing technical safety information; they attend meetings and conferences; they are agreeing on standardization that may be beneficial to safer operation of equipment; they are employing persons trained in safety in both the design and the customer ends of their businesses.

Education and training in safety today is at an all-time high, and offers great promise and hope for the future. Both youth and adults receive benefits. If we can develop our educational resources to instill safety awareness and good attitudes in our younger generation, then tomorrow's adults are bound to make a far better showing than have we.

We are at the crossroads; we are at midstream in accident prevention work. We have come a long way in the past 50 years and we have much more road to travel before we reach our goal of a relatively accident-free rural society. We have great promise, we have good tools with which to work, we have intelligent people—and we are moving ahead.

I have expressed a positive conviction that education holds great promise in reducing future accidents. I must applaud our manufacturers and suppliers of farm needs who are accepting the responsibility of designing and making the safest products possible consistent with today's knowledge and commercial demands. We know that new advances in the technology of safety engineering will bring even greater progress in the years to come.

But those of us who are leaders and citizens promoting farm safety have a sizable task before us. We must learn more on why farm people have accidents and what new approaches can be made to remedy these failures. We must broaden and strengthen the lines of communication to all farm families. We must build good will and prestige for the farm safety movement through well planned public relations. We must know and understand our audience, their needs and responsiveness, to create safety programs that are interesting, practical, saleable and workable in the farm community. We must inventory our resources of potential workers for safety in every community and strive to enlist their willing energies in behalf of accident prevention. We must seek out and obtain the best possible leadership because leadership is a big key to success.

Our outlook on the future must be one of optimism. But, also, we must be realistic enough to recognize that the rural accident problem is complex, difficult, and will not solve itself. Things don't happen just because we hope they will happen—we must work, and work hard to make them happen. We must not become complacent with success, nor become discouraged and defeated in times of frustration or temporary failure. Our humane goal must inspire us to move resolutely ahead. No one in any field of safety has a challenge greater than ours; no one will derive more satisfaction in meeting the challenge than will those working for farm safety.

I do not claim that the so-called big solution or big answer is just around the corner. But I have great faith in our farm people. I believe if we stand behind them by exerting the maximum, most imaginative, most intelligent efforts possible, and if we all accept the challenge set forth in our theme, "Safeguarding Human Worth," accidents to farm families can and will be dramatically reduced. Just how much and to what extent is up to all of us in agriculture and what we elect to put in to meet this challenge.

THE CONTRIBUTIONS OF RESEARCH TOWARDS INCREASED AGRICULTURAL SAFETY

RICHARD G. PFISTER, *Extension Agricultural Safety Engineer, Michigan State University*

American agriculture has been and is one of the most dynamic industries in this century. Agriculture has clearly discarded its arts and crafts identification with which it entered the 20th century. There remains little question but what the agriculture of today is based almost entirely on science and technology.

Any industry that experiences significant change also experiences new problems. Those of us who are vitally concerned with the safety of farm people recognize that new exposure to various hazards is one of the most important problems affecting farm families.

In contrast to other farm practices, we cannot wait for practical experience to determine the need for change in farm safety. No one can justify wastage of human life in order to learn safety by experience. I would contend that experience is a poor teacher because by the time we have an opportunity to gain sufficient knowledge by experience, our environment has changed. Therefore, we must constantly search for new solutions that will help prevent accidents on American farms.

It is gratifying to note that various organizations have engaged in activities and projects that come well within the areas of farm safety research and fact finding. Safety studies, accident surveys, and investigations with safety implications have been carried out by various universities, safety councils, agencies of the U.S. Department of Agriculture, farm organizations, State health boards and departments, agricultural industries, Underwriters' Laboratories, National Fire Protection Association, and many other groups and companies. This broad concern to improve safety is hampered by some definite limitations and problems.

Problems in Farm Safety Research

Considerable progress has been made in the quantity and quality of statistically designed studies to explore the farm accident situation. Much more needs to be done along these particular lines. We still have a definite lack of accurate nonfatal farm accident information. More information is available on fatalities, but this is specifically orientated toward the farm as a location rather than an industry. Therefore, present summaries of farm fatalities include hunters from urban areas and other farm visitors and thus do not give an accurate perspective of the fatalities directly associated with the industry.

There are also many "pet definitions" of a farm accident and some disagreement as to what will be classified as a farm in agricultural safety research. Although such discrepancies may not seem important, they do need further standardization if various research efforts on accident frequency are to effectively contribute toward establishing a national perspective.

A second problem is that of duplication of effort in agricultural safety research. The fact that this duplication of effort has not been great has occurred mostly by chance, since there was no overall coordi-

nating effort in this area until recent years. In other cases, the safety aspects of a particular research project are so closely integrated into the whole research effort that safety is entirely overlooked in the conclusions.

A third problem of farm safety research is that most of the effort has been based on what has happened to the people involved in the accident and how people can better adapt to their specific environment. Only recently has serious recognition been given to changes in design of the physical objects involved in the accident. We need design changes that provide a larger margin of error for the farm operator, so that the death penalty is not so easily invoked. As an example, the saying "Close Cover Before Striking" probably was one of the most printed sentences in the world, and yet people continued to burn their fingers from failing to close the cover on book matches. To provide a larger margin of error, some book matches now have the striking surface on the back, giving increased protection to the user. This is a simple example of how design can be changed to provide for larger human error.

One of the most serious problems to be faced is the lack of financial support for agricultural safety research. For example, let's compare it to other research areas concerned with the preservation of human life. In the United States we spend about \$365 for research for every death from cancer and about \$87 for research for every death from heart disease. In comparison, for every traffic accident death we spend \$2.50 for research.¹ Farm, home, or recreational accident research is less than any of these. Any investigation that attempts to save life cannot be measured in dollars and cents. However, I'm sure we would agree that it is equally respectable to save a life by accident prevention as by disease prevention. We cannot expect the safety specialist, engineer, physician, sociologist, chemist, and others concerned with the preservation of human life and the elimination of preventable accidents to carry out a complex investigation on noon hours, evenings, and weekends. More financial support is needed if research is to become a more effective tool in strengthening progress in farm safety.

Many more problems dealing with research and farm safety could be mentioned. However, these few point out the general nature and scope of the problem area.

Possible Solutions

Many things can be done and are being done to minimize the problems in farm safety research. First, consider the problem of nonfatal accidents and how a more complete response of injury frequency can

See footnotes on p. 154.

be obtained. Examples of well-organized farm accident surveys are available in Indiana,² Missouri,³ Pennsylvania,⁴ Washington,⁵ Iowa,⁶ and several other States. Most of these studies involve a unique design and are applicable to other States. These and other studies should provide incentive to explore further the farm accident situation in those States which do not have such information available.

Perhaps the problem-solving type of farm safety research deserves more emphasis in coming years. Most of the past research has attempted to establish the accident situation and report reliable statistical data pertaining to this situation. This exploratory type of research has been very beneficial and must be carried out continuously to maintain a sensitive perspective. However, it must be supplemented with research that shows why certain accidents happen and suggests specific changes that will prevent accidents. Studies related to the dynamic stability of tractors, braking efficiency of tractors with trailing loads, effect of lack of uniformity in tractor controls on accuracy of the tractor driver's response, the chemical aspects of farm life, evaluation studies on safety programs, and similar topics serve as examples of problem-solving research.

The epidemiological approach deserves more emphasis in our farm safety research programs. This approach simply recognizes the interactions between the human being, the agent that transmits the injury, and the existing environment. In the case of tractor accidents on the highway, we are concerned with the specific details about the tractor operator; the transmitting agent, or tractor; and the environment, or various road conditions, weather and other factors that affect the operation of the tractor or driver at the time of the accident. Typical symptomatic causes of tractor accidents on highways are frequently listed as a motorist misjudging the speed difference between the tractor and the car, or that the rear view of the tractor driver was blocked by the load on a trailing wagon, or turning corners at excessive speeds. In contrast to these symptomatic causes, the real cause might be quite different. For instance, is it conceivable that if the tractor had been equipped with a flashing red light to the rear, or perhaps painted a color not blending into the roadside landscape, that the motorist would have made a better judgment? In the example where view is blocked to the rear, is it possible that a lack of adequate turn signal equipment for the rear of trailing equipment, and the lack of an adequate rear view mirror on the tractor might be the real underlying cause of accidents? Is it conceivable that the tractor driver was traveling at a high rate of speed when he turned the corner because he saw a thunder storm approaching? Therefore, a lack of adequate protection or cab on the tractor may have been the basic

See footnotes on p. 154.

reason for the excessive speed and resulting accident. These hypothetical examples illustrate that we need to become more fundamental and think about what specific changes can be made in various accident transmitting agents to lessen their potential involvement in accidents. We cannot always demand that a person be nearly perfect in his reactions to avoid a farm accident. We need to search and accumulate more detailed information about the specific relationships between environmental conditions, the pieces of equipment, devices, or facilities that are used, and the person operating the tractor.

Now then, a discussion of possible solutions to farm safety research would be totally unrealistic without some attention to the possibilities of financial support. Some possible sources of financial support exist in these three general areas:

1. Public agencies such as the U.S. Department of Agriculture; U.S. Department of Health, Education, and Welfare; State colleges or universities, or State public health services.
2. Private industry, individual companies, and trade associations.
3. Special foundations and technical societies.

One of the most important ways to establish more adequate financial support for any research project is to submit well-organized proposals. All proposed safety research projects should have clear-cut justifications, well-defined objectives, and a study procedure that has a great potential to yield significant findings.

Recommended Courses of Action

In your workshop sessions later in the day, you will be concerned with recommending courses of action which will lead to a safer American agriculture. For those who will be participating in the workshop concerned with research, I would like to submit the following four recommendations for your consideration:

1. That the National Conference for Farm Safety should expand its important role as a national leader for farm safety research.
2. That the National Safety Council, U.S. Department of Agriculture, and interested universities continue to coordinate research efforts and discuss specific research needs through farm safety research conferences.
3. That Federal and State public agencies, private industry, and directors of foundations and professional societies be encouraged to re-examine their allocations to determine what they are doing to provide financial support for agricultural safety research.
4. That accident surveys and various statistical studies on the frequency and severity of farm accidents be invigorated and that this exploratory research be more strongly supported with re-

search that attempts to establish improved equipment designs or improved techniques that will lead to progress in accident prevention.

The people of the United States have received tremendous benefits from research. Although some improvement has been made, there appears to be considerable lag in quantity and quality of research in farm safety. An expanded research program can provide a much sounder foundation for the development of improved safety engineering and effective safety education in American agriculture.

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A SAFER AMERICAN AGRICULTURE THROUGH ENGINEERING AND ENVIRONMENTAL SAFEGUARDS

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From its very beginning, there have been hazards associated with American agriculture. The swinging scythe in the hands of a careless worker, the ill-tempered ox that may have gored his master in rebellion against the pricks of the goad, the wild horses of the plains that reluctantly gave up their freedom, the "female of the species" defending her young, all may have brought injury on occasion to the early American farmer and his family.

In the 1800's, momentous changes began to take place, marked in the minds of many by McCormick's reaper and John Deere's steel plow. These noteworthy developments were augmented by the efforts of countless other ingenious individuals whose contributions also tended to move the load of raising the food for a hungry Nation off the backs of men.

One of those pioneers who became inseparably associated with this movement was Jerome Increase Case. Machines of his making were

used to thresh the bundles of grain tied by the binders that succeeded McCormick's reaper. Power to run the threshers came from horse-operated treadmills and from the endless circle arrangement moved by several teams of horses, known as the "horsepower." Back in the 1890's, my father used to "tend separator" and I, born just past the turn of the century, obtained no little pleasure from sitting on one of the drive wheels of the large steam threshing engine as it rocked back and forth in rhythm with the powerful thrusts of steam in its cylinder. Usually this was not for long as too often the engineer would see me and say, "Boy, get down from there before you get hurt!"

Steam, with all of its romance, gave way to large tractors similar in appearance oftentimes to the "steamers," but powered by large one-, two-, or four-cylinder internal combustion engines. Some of the early ones, as my old friend, D. P. Davies of Case, once put it, "exhausted themselves by their own propulsion." They were related, it seemed, to Mark Twain's Mississippi River steamboats that had to stop from lack of steam every time they blew the whistle.

Tractors were finding a place on more and more farms and under the stress of producing food for our people with reduced farm labor in World War I days, the manufacturers of such tractors as Hart Parr, Case, Waterloo Boy, Parrett, Frick, Huber, Rumley, Moline Universal, IHC's Titan and Mogul, the little Fordson, and a host of others gained a foothold.

Thousands of farmers and farmers' sons moved around and about this strange new beast and in the process learned many things. Some of the learning was at considerable cost in money, in injuries, and sometimes in the life of an operator. Owners of the Fordson found that it had a propensity for tipping over backwards. One of my old tractor friends, Jack Rutledge, told of the mercury ignition switch designed to prevent such accidents and sold by Jack and his partner with "screaming ads" of "Mothers, save your sons!" along with reprints of newspaper accounts telling of such accidents. The switch wasn't very effective actually, but it was recognition of a problem. Learning where and how to hitch to the tractor—what you could and could not do—with impunity—was the better course.

As the adolescent tractor years go by, a more definite design pattern begins to appear. From the one, two, three, and four-wheel-drive tractor, along with the track-layer or crawler, users began to express a preference and designers worked then, as now, in an effort to give the user what they thought he would like to have.

Initially, the tractor relieved the horse of that hot summer job—plowing. There was interest in and early attempts to motorize the

row crop cultivator, but credit goes to Bert Benjamin and his IH coworkers for conceiving and producing the tricycle row crop tractor whose very name—the Farmall—has become synonymous with this type of tractor.

The summer of 1915 was a remarkably wet one in Kansas, Nebraska, and some of the neighboring States. The ground-wheel drive on grain binders would not function under such conditions and farmers mounted engines on the binders and the binders on sleds or beer-barrel rollers to harvest their crops. The small but sturdy and dependable water-cooled engines made by Cushman of Lincoln, Nebr., were tremendously popular for this application and they remained on many a midwestern farm to pump water for the livestock long after their original use was all but forgotten. The present familiarity with the company name is due to the wide use of their “scooter” during World War II days and, of course, currently to carry tired golfers, not-so-tired postmen, as well as delivery boys, pleasure-seekers, and others.

Following this demonstration of need for a more dependable source of power for harvesting machines than the ground-wheel drive, there came in the mid-20's an important development—the application of power from a tractor to a drawn machine through a flexible, jointed shaft. This device came to be known as the power take-off, or more popularly—the PTO.

Designed first to be used on grain binders, the PTO soon found application on other harvesting machines. Through the years, it has been widely used and just recently has taken over much of the work traditionally done by the belt pulley and long, flat drive belt. As first used, the PTO was not shielded and inevitably, accidents occurred—a few ludicrous, some tragic. The situation impressed the consciousness—and the conscience—of the designers who, as they met under Farm Equipment Institute auspices to develop standards permitting the inter-use of tractors and machines, decided that shielding was in order.

Inverted-U or tunnel-type shielding was first proposed. The shielding was supplied with the drawn machine and was designed to attach to the master shield of each tractor, interchangeably. The shielding was *effective when used* and therein lay the crux of the whole protection problem. Many farmers did not use it. Reasons given for its nonuse included:

- a. It won't happen to me, I'm careful.
- b. This shielding gets all bent up—it's too hard to fasten together.
- c. I've forgotten where I put it the last time I used it.

Blame for the situation could be placed on both designer and user. The designer's next move was to incorporate flat straps, or "belly bands" into the underside of the shielding, and it was called non-removable. It wasn't though, really, because users and even some dealers took a hack saw or a cutting torch to the retaining straps and the shields were laid aside or used as each farmer expressed his feeling toward this protective device.

Some other variations of the tunnel shield were tried, but most desirable of all is the tubular shield, sometimes called the "spinner shield," which now has industry approval and encouragement. It is always in place and it does not seriously interfere when the tractor operator is connecting the PTO shaft to the tractor. The whole development illustrates one of my favorite comments: that we need to make it easy for farmers to operate their machines safely.

Concurrently, in a rough sort of way, with the initiation of the PTO and the methods of guarding, has been the improvement of a number of other tractor and implement components.

For example, early tractor seats were pan-shaped, made of cast iron grillwork often with the name of the manufacturer cast in the bottom. They have been made more comfortable over the years to the point where now they rival the finest office chairs. Foolishness, some might say. Not so! The tractor operator is far less tired than he used to be at the end of the day's work and far more likely to act quickly and safely should an emergency arise.

Hydraulic power raises and lowers today's implements, regulates the depth of today's plows, steers today's tractors, applies the brakes, and shifts the gears. If you still have strength enough to lift your little finger, you can drive today's tractor. Not really, of course, but it isn't the exhausting, sometimes back-breaking, job it used to be.

What a fortunate individual is today's farmer, you may very well speculate. He has a multitude of blessings that have come out of this mechanical—electrical—scientific—chemical—age. Call it what you will, the impact on American agriculture has been tremendous.

With all these blessings have come responsibilities.

Responsibilities on the part of designers and their kin to recognize new hazards, new irritants, new situations, and some old ones that never received proper attention, so that safeguards may be set up; responsibilities on the part of the farmer, his family, and those others who work closely with him to also recognize these same hazards, to hold in such respect these hazards and the protection provided that they use it, that they *follow the rules*.

We have not the time just now to make an exhaustive study of these irritations and their possible correction, but let us look at some of them—through the eyes of the designer—the hazard first, and then the safeguard.

1. *Getting on and off tractors and implements*—give thought to secure, sturdy steps and ladders with good, non-slip tread, with handholds where need is indicated.
2. *Controls for the various tractor and machine functions*—achieve uniformity insofar as is practical so that the user knows where he may expect to find the throttle, the clutch, the steering wheel, the brakes, and the other major contacts with tractor and implement function.
3. *Lights—to illuminate the pathway and the work area*—this has resulted in head lights—in work lights—tail lights—warning lights—flashing lights—self-powered lights—reflectors—attaching brackets, and, don't forget—flags and mirrors.
4. *Adjustments*—the old, hard-to-reach, hard-to-operate hand control lever for implement adjustment has been largely replaced by hydraulic powered cylinders—some plunger-type, some vane, some rotary; electric motors and solenoids—requiring thumb and forefinger valving or push button control. Willing servants, all of them, they still require proper care and intelligent use.
5. *Belts, chain, gears, and other exposed moving parts*—shielding that reduces the hazard and still permits essential function is in the designer's mind as he toils over the conception and development of each new machine.

What's the operator's responsibility? To use these devices in the places where it was intended that they be used, not for fence post ornamentation.

6. *Glass breakage*—now there's a hazard that Israel Putnam, with his hands on his plow behind his yoke of oxen, didn't have to worry about. Not that he didn't have things on his mind as he abandoned the plow and the oxen, according to legend, and hurried away to the American Revolution. Our designer, if he is wise, uses the sort of glass in tractor and combine cabs that, when and if it breaks, is least likely to cause injury. Some, you know, breaks into a thousand harmless pieces, and others may take the form of swords and daggers. There's the matter of fuel filter bowls, too. This glass should be heat resistant so that if a fire occurs in that critical area, it does not break the glass and add fuel to the flames.

7. *Fuel leakage and spillage*—this is something that a designer can influence initially and the user can, by proper maintenance and good operating practices, eliminate the danger of fires and explosions.

Up to this point, we have talked much about machines and how to build them. We have laid emphasis on engineering. Let us now look at an area not so closely related to function, but still not entirely divorced from the designer and his counterpart in other areas touching American agriculture, specifically, the farmer and his family. Let us talk about environmental irritants. Such a list might well include:

1. *Noise*—engine exhaust, gear and chain movement, blowers, beaters, flails, rollers, movement of crop—all annoying to a greater or lesser degree. A not-insoluble problem, but one that requires individual attention to each situation if improvement is to be made.
2. *Dust*—field dust and crop dust. A reduction in the amount of dust such as has resulted from the use of rubber tires instead of steel wheels and the isolation of the operator in a cab or local protection by respirators of one kind or another are the kind of improvements we have in mind.
3. *Vibration*—caused in general by reciprocating parts such as mower cutter bars, the separating and cleaning mechanism of combines, and the conveyor belts of potato and sugarbeet harvestors. Developing as much freedom from vibration as is compatible with function is a job for the designer. Holding vibration due to normal wear to a minimum is a responsibility of the operator. Some real gains have been made in reducing vibration.
4. *Extremes of heat and cold*—problems that are being met by the use of cabs, cooled, heated, ventilated—along with the more simple sunshades and “weather-brakes.”
5. *Engine exhaust fumes*—annoying, it’s true, but facilities in the form of the tall, vertical stack or the exhaust pipe, going down and under the tractor are available for tractors and other engine-powered units.
6. *Chemicals*—What an array! Fungicides, pesticides, herbicides, fertilizers, and even fuels. What a far cry from the days when we tried to discourage potato bugs with paris green and grandma made soap with pork fat and lye.

In these times, if you do not read the warning labels on the containers or the decals on the application equipment, it may cost you your life. Knowing these things and following the rules,

one may safely use all these available weapons. In case someone makes a mistake, information centers are available and known to the medical profession. Groups such as the Institute for Agricultural Medicine at the University in Iowa City keep abreast of—rather, I should say, exhibit leadership in this area.

7. *Zoonotic diseases*—strange word to you? Me, too! But my veterinary friend at Moline said to me, “That’s a good word for the folks at Iowa City, but why don’t you just say, ‘Diseases of animals that are communicable to man.’” There’s quite a list, including lepto-spirosis, brucellosis or undulant fever, anthrax, tularemia, rabies, and others. In any case, they represent a real hazard to human life. They form a part of the overall environment that demands attention if you want to live a healthy life in company with the hogs, the cows, and the chickens. An impossible situation? No, just learn the rules and follow them.
8. *The farmhouse*—many details in the design, construction, and maintenance of the dwelling, the grain storage buildings, the livestock shelters, the materials handling equipment, have a bearing on the safety of our farm family. Would you believe it—falls still rank high on the list of unfortunate things that can happen to you on the farm.

There’s a lot of “do-it-yourself” in the design and construction of farm buildings, but it’s no sin to ask for help. Engineers can create things . . . agricultural engineers apply the principles of engineering to agriculture. For years there have been extension agricultural engineers at land grant colleges and in industry, but they still haven’t solved the problem of making sure that all farm homes provide an environment that promotes safe living. They are making progress. Let’s encourage them as they help the farmer look at his home with the eyes of a safety engineer.

9. *The psychological aspects of the farm environment*—we mean, “How does the farm family feel about safety?” When they stop to think about it—when they are reflecting on what has happened and how it might have been prevented, after some family member has been injured, they are full of good resolutions—so are we all—that’s “human frailty”; but to do something about it—to be continually alert—there’s a job for the whole family.

So—be it engineering or environment—there is work for us all if American agriculture is to be safe. You remember the phrase, “Eternal vigilance is the price of liberty.” Let me suggest that eternal vigilance is also the price of safety.

A SAFER AMERICAN AGRICULTURE THROUGH THE USE OF EDUCATIONAL RESOURCES

J. B. CLAAR, *Associate Director of Extension, University of Illinois*

The agricultural industry always has been an area of high accident rates. Only two broad industry groups have higher rates.

The mechanization of agriculture doubtless has increased the exposure of farm people to accidents in their daily work activities. In addition, the increased mobility of farm people exposes them to the same hazards to which other segments of the population are subjected.

Too, the movement of machinery on highways has increased as expanded farm units include more acreages not adjacent to the basic unit. Added to this are the risks of accidents around the home. These and other factors mean that we have a real challenge in cutting accidents in agriculture to a minimum.

This is an area worthy of our time and energy. Accidents rob family savings, reduce production efficiency, and create human misery. Research indicates that a great many accidents could have been prevented. Attacking this problem through the use of educational resources requires knowledge of the type of accidents, their frequency, and best approach to prevention.

Data on farm accidents indicate the following major accident areas:

Farm Resident Accidents 1959

	<i>Deaths</i>	<i>Disabling injuries</i>
Motor vehicle.....	¹ 5, 300	200, 000
Home	2, 700	400, 000
Work	¹ 3, 400	300, 000
Public nonmotor vehicle	900	120, 000
	<hr/> 11, 700	<hr/> 1, 000, 000

¹ Motor-vehicle deaths and injuries in work activities are included in both the motor-vehicle and work totals. The duplication amounted to about 600 deaths and 20,000 injuries in 1959.

Source: National Safety Council, *Accident Facts, 1960*.

Obviously the solution to these problems requires a coordinated attack from many sources. Education can make these contributions:

1. Research on accident prevention and surveys to determine the sources of accidents and evaluation of prevention efforts.
2. Campaign-type activities such as corn picking, spring clean-up, national farm safety week, and national fire prevention week.
3. Continuing education on the care, maintenance and proper use of machinery, farm buildings, etc. By agreement of many groups to



A Delegate Takes Part in Workshop Discussion.

prevent accidents, two areas per year are emphasized. In 1961-62 motor vehicles and farm machinery are the selected areas.

4. The use of educational resources to constantly keep the public safety-conscious and aware of the steps which they can take to lead accident-free lives.

Principal Audiences

The principal clientele of these educational efforts are :

- A. Farm and other families.
- B. Communities.
- C. Individuals.

In doing this work many people must move in concert. The sources of information are widespread, and the coordinating role of educational resources is an important first step in the educational program.

A great deal of educational work is being carried forward with many people contributing to it. Educational materials are developed in a unified way at national and State levels. Regular national releases are developed on a campaign basis such as National Fire Prevention Week, and a continual educational program of factual information is developed through the U.S.D.A. and other groups.

The State Extension Services carry on a program in safety with both adults and youth. Active youth projects are developed in many aspects of farm, home and community safety. These are very effective for they reach into the various facets of the community and directly into the farms and homes.

Solutions of Problems

In performing this educational function, it is important that safety be integrated into every aspect of educational programs. No educational effort should be complete until the safety aspect is treated. This calls for good communication between safety specialists, groups who have safety information, and the various specialists and county workers.

A critical need to achieve this kind of educational work is a focal point of leadership. A favorable administrative climate is important to the development of any educational effort. But this is not enough. A focal point of safety leadership is critical to a strong program. Many people with good intentions may fail to get in some good educational licks for safety if there is not someone available to help find

the information, call it to their attention, and keep up constant encouragement to develop and use the program information.

I hope that more institutions specializing in this area can be set up to provide a focal point of leadership in safety. In my opinion, it is important to a successful safety program. I draw upon our own experience in Illinois for this opinion. We feel we have a pretty good program. People other than our safety specialist are effective teachers in this area, but our safety specialist is a key person in developing the program.

As a complementary move to the expansion of educational specialists, the excellent cooperation between these and other specialists might well be expanded. These specialists in other agencies are significant forces in safety education, and it is important to the objectives that they work closely with the leaders of safety education. I'm very hopeful that through such close cooperation the educational impact can be expanded and the information well coordinated.

Research and experience indicate that through the combined efforts of every group who can contribute, accidents can be reduced. This educational task continues to be a challenge and merits our best efforts.

ORGANIZED ACTION FOR LONG TERM PROGRAMS

W. E. STUCKEY, *Extension Specialist in Safety, Ohio State University*

All of us attending this Conference are fully aware of the accident situation as it applies to our farm population. We need not belabor this point except to say that ours is a unique problem when compared to the other occupations. We do not have safety directors as they do in many manufacturing plants telling us what to do and what not to do. In most States we do not have enforcement officials watching our every move. Generally speaking, the owner of a farm also manages that farm. On 84 percent of our farms, the labor force consists primarily of members of the family. Conditions under which we work change by the month, day, and even by the hour. I could go on pointing out factors that make our safety problem difficult, but I believe I have made my point. None of us wants to change our way of life; however, we must realize that this way of life does create some safety problems that challenge the imagination.

Some would try to solve this problem by passing a law or establishing regulations. Others would put the blame on inadequate engineer-

ing. All of us, I believe, would agree that both of these solutions have a place. However, to say that legislation and engineering is the answer to this complex problem is nothing but wishful thinking.

With this in mind, where does this leave us in the solution to our problems? Of course, the key word is *education*. An educational program that will reach every farm resident in the United States. A program that will inform and motivate our people to recognize and remove hazardous conditions, and follow safe practices.

This means that every farm adult and farm youth organization and agency must accept the challenge for a safe rural America. They must accept the responsibility of formulating a safety educational program for their members and clientele. The problem we face is how do we get all of these groups to do this important job?

At the President's Conference on Occupational Safety held in May 1956, it was recognized that a State farm safety committee is a basic essential in the conduct of a successful statewide farm safety program. Also at the 1956 Conference, they defined the objectives and functions of such a committee and made recommendations pertaining to the organizational structure.

Let us take a look at where we are and where we are going. During the last decade, we have made tremendous progress under the leadership of the Farm Department and Farm Conference of the National Safety Council. As of January 26, 46 of our States now have Farm Safety Committees. Some of these committees have very effective programs. They meet and plan together with members accepting certain responsibilities. In these States there is definite evidence that accidents are being reduced. In other States the committees are semi-active. They are carrying out a modest program but have not yet reached their potential. Then, of course, we have those committees which are just getting started. They are primarily paper committees.

Working with these committees, in 12 States we have full-time extension safety specialists; 31 States have part-time extension safety specialists. In addition, safety specialists employed by farm organizations and other groups are active in 15 States.

As I said, much progress has been made but we are just starting the big push. During the next few years it is imperative that all States have an effective long-term organization that will have two important objectives:

1. To develop the effective ability of farm people to recognize and eliminate unsafe living and working conditions.
2. To develop among farm people attitudes and appreciations that will result in safe practices and habits.

The key words in these objectives are conditions and practices. If people eliminate hazardous conditions and do whatever they are doing the safe way, for all practical purposes our problem would be solved.

Through organized action we can reduce accidents. During the past 17 years, I have been serving on a State farm safety committee, as a member, its secretary, and its chairman. I have observed, studied, and participated in such programs from coast to coast. My experience in this field has convinced me that thinking together is a beginning, planning together is progress, and working together is success.

Some have asked what it takes to keep such a group active. Most people have found that it takes time, energy, faith, fellowship, and conviction. I might add that this conviction must be in the heart as well as the head. If the agricultural leadership is convinced that a farm safety committee is necessary, it is quite likely it will find the time and energy.

The organizational structure of such a committee has been well defined. Those States that have had successful programs for a number of years have a great deal to offer in this regard. This information is available through the Farm Department of the National Safety Council. However, I would like to suggest that it is desirable to have representatives of all agricultural agencies and organizations within the State, as well as allied and related interests, represented on the State committee.

The functions and activities of a State-level farm safety committee should be determined by the needs. However, there are some functions that would apply to most States. Let us examine a few of these functions: 1. Determine the safety needs of the people in the State. This can be done through studies of accidents and by reporting systems. 2. Develop a program to meet these needs. Select the areas for emphasis and recommend by whom, how, and when the activity will be conducted. 3. Provide adequate finances to carry out the activities. 4. Serve as a coordinating group for the entire farm safety program in the State. 5. Stimulate cooperating organizations and agencies to formulate and carry out effective educational safety programs. 6. Study needs and make recommendations on legislation, enforcement and engineering pertaining to safety. 7. Suggest research projects and assist in getting needed research underway. 8. Provide recognition and awards for safety accomplishments.

I would like to conclude by suggesting that one of the greatest weaknesses in our accident prevention programs is the fallacy that once

we have conducted a certain program, we conclude that the job is done. Nothing could be further from the truth.

Programs by our State Committees, the FFA, 4-H Clubs, farm organizations, Federal agencies and other such programs are excellent. However, we should realize that if we are to be a continuing factor in accident prevention we must constantly evaluate and expand our programs.

I hope that you will agree with me that this business of safety education is a very constant business—the fact that we told the story yesterday should not lead us into the delusion of supposing the story has been told. Cultivating safety habits is a day-by-day, hour-by-hour business. Today we hope to discuss how this important job can be continued.

A SAFER AMERICAN AGRICULTURE THROUGH ORGANIZED ACTION FOR EMERGENCY PROGRAMS

JAMES E. CROSBY, JR., *Program Leader, Rural Defense, Federal Extension Service, U.S. Department of Agriculture*

Let's start by spelling out my interpretation of this assignment. The dictionary defines "emergency" as: "an unforeseen combination of circumstances which calls for immediate action."

But any accident causes an emergency. Then what difference is there between my topic, "Action for Emergency Programs" and the preceding talk, "Action for Long-Term Programs"?

I assume that I am to discuss problems or dangers that may occur only once, or at least very rarely. I also conclude that the program committee wanted a discussion of those emergencies which would affect numerous members of the farm community in any given emergency—rather than one at a time.

Immediately several types of natural disaster emergencies come to mind—floods, blizzards, hurricanes, and tornadoes. Each of these reoccur frequently—the uncertainty centers about when they will happen and how severe their damage.

Unfortunately we must add new potential dangers to this list. In any future war, farm people must prepare against the possibility of biological warfare (against humans, animals, and plants), widespread rural fires, and radioactive fallout resulting from nuclear explosions.

These latter clearly classify as emergency programs. They could create serious hazards in any part of the United States. They could

endanger large parts of our population. Their control would require new knowledge.

Application of any of these tools of modern warfare would call for "immediate action." Immediate action, to be effective, depends on prior organization and planning.

These hazards could affect farm people either directly or indirectly. I believe the dangers from widespread rural fires are self evident.

Biological warfare could include diseases of humans, diseases of livestock communicable to man, the modern versions of the poison gas of World War I, etc.

Radioactive fallout can cause sickness or death in humans. It does so by damage or destruction of body cells. Early fallout, within the first few days after an explosion, would do most damage by direct exposure to its radiation.

After the first few days, radioactive damage results from the fallout taken into the body with food or water or the air we breathe.

Still later food products themselves may contain radioactivity brought into the food chain through contaminated soil or water used in crop production.

Fortunately we know pretty well how to deal with the emergencies discussed above. I find myself beyond my depth on trying to discuss organizations which have already demonstrated their ability to cope with the natural disasters. I am certain that this audience already knows more about the accomplishments of Red Cross, Civil Defense, and other organized and emergency groups than I can report.

We have just begun to realize some of the problems which future wars could create. But with this realization, we have organized for emergency action. Government, at all levels, has assigned personnel to identify possible problems, to develop emergency plans, and to carry out those plans in case any of these potential problems materialize.

Civil Defense, the Department of Health, Education, and Welfare, and the Department of Agriculture, in particular, have assignments to insure a Safer American Agriculture in case of nuclear warfare. Comparable State agencies cooperate in many of these programs.

The following examples illustrate the problems recognized, the action proposed, and the agency responsible for leadership.

Radioactive Fallout

- a. To determine its location and intensity, danger from exposure—a nationwide monitoring program, at least 100,000 monitoring stations, operated by personnel from Civil Defense and the U.S.

Department of Agriculture. Information broadcast by Civil Defense via radio.

- b. To acquaint rural people with methods of protection against radioactive fallout—USDA.
- c. To inspect food products for freedom from radioactive contamination—USDA and Federal, State and local public health units.
- d. To teach rural people difference between irradiation, contamination and radioactivity of food or water—USDA.
- e. To introduce changes in farm practices which might be needed to produce healthful food after widespread radioactive fallout—USDA.

Biological Warfare

- a. Against humans—Federal, State and local public health units.
- b. Against livestock—Federal, State and private veterinarians.

Rural Fire Control

Program leadership by national, State and local rural fire defense committees—national leadership in USDA.

Much still remains to be done on these problems to insure a Safer American Agriculture. Research already has developed an amazing amount of knowledge about these very new problems. But we must carry on much more research to verify preliminary findings, to provide more effective solutions, and to explore possibilities of eliminating the problems themselves.

But additional knowledge by itself will not solve these problems. Farm people generally must have access to this knowledge, must understand these facts, and must act accordingly.

Today a lack of understanding among our people is the one real obstacle to insuring American agriculture against the potential danger of radioactive fallout. We have the knowledge needed but emotion seems to influence the thinking of most people.

Collectively, all of us concerned with agricultural safety need to stress a few fundamental facts.

1. We now live in a new era—one in which nuclear warfare could occur anywhere. The danger of radioactive fallout is a threat with which all of us must live. We must adjust our lives accordingly.
2. For farm people, Civil Defense has two special aspects: (a) the danger would come from radioactive fallout, not from blast; and (b) most farm families would need to be self-sufficient, need to

prepare to survive *at home* with their livestock—rather than depending on a community shelter like their city cousins.

3. Most Americans, particularly those in rural areas, can insure against this danger. If we stress *insurance* most people will develop a very different attitude.

You have all heard the story of the salesman for fallout shelters who offered them with payment spread over the next 20 years. And of the prospective buyer who didn't think he needed one if he had 20 years ahead of him.

How many of you have paid premiums on fire insurance for the last 20 years? Why didn't you wait until the year you were going to have a fire before you took out your policy?

That last is a silly question, isn't it? You don't know when you are going to have a fire unless, that is, you are planning a fire sale. What's more, most of us hope we never suffer a fire loss, but we cheerfully pay our insurance premiums every year—just in case.

A Safer American Agriculture in this age of nuclear missiles is just that simple—through civil defense we insure against the worst—and work and hope for the best.

It was suggested that we panel members specify appropriate organizations to implement desired action.

I mentioned the need for more research on these problems. I do not criticize our present researchers or their results. What we need here is more time and possibly more resources.

Stimulating farm people to protect themselves against emergencies depends first on the effective use of educational resources. We must attempt to employ all educational resources available for the task and to coordinate these efforts into one overall educational message.

For the Federal Government, the Cooperative Extension Service has responsibility for leadership in this educational program. Extension has accepted this job. But we in Extension know full well how big this job will be. We invite every organization and group interested in the problem to explore ways of developing a coordinated program to which all of us can contribute.

WORKSHOP: SAFETY IN MATERIALS HANDLING—TRANSPORTATION

*Moderator: ROBERT D. GIDEL, Chief, Division of Safety, Bureau of Labor
Standards, U.S. Department of Labor*

ON THE RAILROADS

*ROY P. HAMILTON, Superintendent of Safety, St. Louis-San Francisco
Railway Company*

The subject "Materials Handling in Transportation" is certainly of interest to railroad management and employees, the shippers and public. The only change I would suggest making in the title is to add the word "safe" before "materials" because the objective of all railroad personnel is to handle the materials entrusted to their care safely.

Ever since the beginning of transportation by rail, relative safety, efficiency and dependability have been inseparable characteristics and selling points. In the fabric of the railway network these qualities are interwoven and interdependent. Anything that impairs one works to the disadvantage of the others. Thus the unsafe is not efficient, the inefficient not dependable. Here, then, is one of the major reasons why the advancement of safety is not only the humane desire, but the accepted responsibility of those charged with successful management and operation of railway transport as a going business in a highly competitive field.

Every railroad accident is the result of failure—failure of some part of the roadway, some part of the equipment, or some man or men. Therefore, safety has been the subject of systematic, scientific study and attention throughout the years. There has been great investment in the improvement of roadway and equipment which engineering and inventions have developed. There has been unremitting attention to education in safe thinking and safe practices among railroad men. Proper training of old and new employees is a very important facet in reducing accidents and personal injuries. The railroads are as hard at work on safety today as ever. They know that there is no new gadget, or combination of gadgets, which will make railroads perfectly safe; but they know, also, that there can be further improvements in the three essentials of safe operations—safe roadway, safe equipment, safe men—and they are continually at work to make such improvements.

Railroad management realizes that in the American future our national purpose requires that we have a safe, efficient, and low-cost system of transportation. This means that our railroads, which have been an important part of our past, must also be part of our future. As always, the story of progress will be written by a dynamic industry whose emblem is the flanged wheel. Along with the rails on which it turns, the flanged wheel is unique to railroad transportation. It is the only wheel that needs no steering. In the long history of man's development of the wheel, the wheel with the flange—less than two centuries old—is, technically, the newest wheel of all. It has always been an important American wheel; and will continue to be an important wheel in the American future.

To exact from the flanged wheel the efficiency required by the world of tomorrow, and to assure Americans of the safety and comfort of rail transportation today, the railroad industry has joined with science in a union that is making news. Research centers are staffed by scientists who, like locomotive engineers and conductors, are in the fullest sense "railroad" men. The technician may be an employee of a railroad or of one of the manufacturers who supply the roads each year with over a billion dollars worth of everything from bridges to brake shoes. This is being done to assure safety to the employees and the public and that materials will move safely over the rails.

Stress and strain are inherent in moving parts. They are common to all forms of transportation. The safety, reliability, and comfort of modern rail transportation are due to the industry's constant study of these factors. Not all of the work that is being done by the railroads to prevent equipment failures due to stress and strain is done in the research center. In the yard and shop, applied science makes the railroad wheel more efficient; ultrasonic waves inspect the axle. "Echoscoping" they call it. The flange is inspected by an electronic sentinel. Even the smallest defect shows up as the wheel moves over the sawtooth detector. A flanged wheel must roll evenly on the rails. The wheel-truing machine grinds away worn places in the tread and flange. Wheel truing a giant diesel locomotive is something like a blacksmith putting new shoes on a horse without taking the old ones off. In such ways applied science stands guard over the flanged wheel and guarantees the safety, comfort, and efficiency of railroad transportation.

As with the wheel, so with the rails—for it's upon them that the wheels of the future roll. Applied science has proved that the smoothest riding track for passengers and freight is a continuous welded rail. That's why the railroads are laying so much of it. Machines perfected by research and engineering perform the task as short-length sections

of track are replaced by new quarter-mile ribbons of welded rail. The toil of sweating gandy dancers, laboring with their pick axes on the section gang of yesterday, is but a legend to the track worker moving forward at his steady but comfortable pace in the rail-laying procession of today. Wherever they turn, the flanged wheels roll toward the future over a track structure that, because of science and engineering, is not only efficient but safe.

In what other ways does railroad science assure us of a record of safety unmatched by any other form of transportation? Here are several important ones:

A trackside cell sensitive to infra-red rays detects overheated journal boxes. Through microwave and the railroad's radio network, the report is flashed to the central recording room. Into this quiet room, scores of ever-alert eyes, on duty night and day, scanning the wheels as they fly by, feed the electronic information that enables the railroads to get the cargo there safely—and on time.

Today it is possible for the officer on duty to get in touch with a speeding train by radio telephone. It is also possible for the conductor sitting in the caboose to converse with his engineer or brakeman on matters concerning the safe operation of their train. Today, 30,000 miles of railroad network are operated by CTC, centralized traffic control, transportation's most fully developed system of scheduling traffic. An engineer may control the speed of his particular train; but he, in turn, is guided by the CTC dispatcher. The dispatcher isn't aware of passing scenery; but, more than the engineer, he sees the overall pattern of traffic. Somewhere on the system two trains are approaching. The switches that will open, the speed to be run, are synchronized and controlled by a push button, perhaps three hundred miles away from the scene of action. Bearing priceless lives and valuable cargoes, our trains today pass safely by day and night—thanks to a marvel of electronic science.

The scientists and engineers who conceived and designed the automated classification yard seized upon nature's most familiar phenomenon, the force of gravity and, through electronics, harnessed it to their needs. Today there are a number of these automated yards in use and in the years ahead there will be many more. They are being built for safety and efficiency in operations.

Other items of importance are:

Mechanized equipment for laying rail, renewing ties, surfacing roadway, etc.,

Choreboys and forklift machines for handling material in freight houses, shops, etc.; spring switches in electric block territory; power hand brakes; nonspin hand brakes; heavier rail; heavier equipment.

Modern visual training aids and educational media such as modern

safety cars equipped with CTC boards, various types of switches, hand brakes, couplers, motor car indicators, for training employees both old and new.

I have cited many things that have been and are being done by the railroads through research, fact-finding, and engineering safeguards to promote safety and efficiency in the past, what they are doing today and will continue to do tomorrow to assure their employees and the public the safest form of transportation possible.

As I look back over the years since I started to work on the railroad as a locomotive fireman, later transferring to train service as a brakeman and then promoted to conductor, I cannot help but marvel at the changes that have been made by the railroads in their efforts to reduce accidents and personal injuries. Take, for example, CTC, centralized traffic control. This system prevents the possibility of a crew overlooking a meet order and eliminates the need of the brakeman going ahead of the engine to line the switch to the siding and then getting a signal from the flagman when he lines the switch behind the caboose when entering or leaving the siding. Today, the brakeman or flagman does not have to leave the engine or caboose when entering or leaving the siding; the switches are handled by the CTC dispatcher, often many miles away.

Today, if there is something that affects the operation of the train, the conductor can converse with the head end by radio. That was not the case when I started to work. Today, the switchmen do not have to ride cars in the automated hump yards as they did in the hump yards of the past. These are just a few of the improvements that have been made over the years and you can be sure that there will be many more improvements in the future to promote safety and efficiency on the railroads.

So far, I have talked about what has been done by the railroads through research, fact-finding, and engineering safeguards to make the roadway and equipment safe. I do not think that anyone would say that modern equipment and facilities have not proven their worth, but it would be an unjustified conclusion to presume that safety can be bought with dollars alone—or that accidents can be prevented solely by introducing the latest in mechanical devices. Experience has taught that safety in railway transportation involves far more than the provision of safe roadway, safe structures and safe equipment. Of overwhelming importance is the safe man. A rigid enforcement of rules, periodic examinations of workers, a continuing campaign of accident investigation and employee education are still the requisites of safe operations. Thus, training is of the utmost importance. Block signals, cab signals, even automatic train control, are of little value if the tried and tested rules of train operation are

not followed. By the same token, safety shoes left under the bed are no protection against crushed toes; goggles left in the locker or on the workbench stop nothing but dust.

Probably in no other line of endeavor can one find a more comprehensive set of rules to govern the employee in the safe discharge of his duties than that which exists in the railroad industry. Time-tested, subject to continuous scrutiny, sometimes carefully modified to meet changing conditions, and passed on down from generation to generation, they represent the wisdom, the experience, the know-how of more than a century. Faithfully observed, they offer far more than adequate protection against any mishap in any circumstance that can be foreseen in the moving world of transport. They constitute, in effect, a bible by which the employee can be guided on the job—a bible which begins with the admonition that "Safety is of the first importance in the discharge of duty" and "Obedience to the rules is essential to safety." So it is that the human factor must remain the predominant thought in the minds of those who would further the cause of accident prevention.

Research and fact-finding, engineering safeguards, training, and communications are vital if we are to continue the progress the railroads have made over the years in preventing accidents and handling materials safely. To assure this, the Association of American Railroads has a modern research center. This center, which is located on 41½ acres at the Illinois Institute of Technology in Chicago, conducts research on matters of common interest to the American railroads.

This research work, multiplied by the efforts of individual railroads and equipment manufacturers, forms the first step toward introducing basic improvements in railroad plant and equipment. It has been the forerunner of the modernized rail system developed since the end of World War II by the private railroad investment of more than \$16 billion, a program which has brought a revolution in railroad motive power, a development of many types of specialized equipment and components, improved traffic control systems, stronger rail and smoother roadbed.

The railroads are going to continue their efforts to provide safe and efficient transportation. To achieve that objective and further reduce accidents and personal injuries in handling materials in transportation, my recommendations are: Railroad management continue the work it is doing in research, fact-finding, engineering safeguards, and safety education; all railroad personnel join the program to train employees, both old and new, how to perform their jobs safely and to comply with the operating and safety rules, realizing at all times that a safe man is the most valuable asset a railroad team can have.

ON THE RAILROADS

A. H. CHESSEY, *Chairman, Committee on Safety of the Railway Labor Executives' Association*

This meeting in which we are now participating is a welcome departure from tradition, as far as railroad workers of this country are concerned.

We have always been concerned with safety—there is no industry more concerned with safety than this railroad industry of ours.

And the men who operate the Nation's trains have in their railroad unions a prime example of this regard for safety. The fact is that many of these organizations arose because of the dangers and disasters arising from the lack of safe practices in the early railroad industry of this country.

When my own Brotherhood of Railroad Trainmen was founded in 1883, operating railroad employees were being killed and injured so frequently that no commercial insurance company would sell them insurance.

It was common practice for railroad workers in an area to band together in societies designed to provide enough money to bury fellow-workers killed on the job, and perhaps provide a few dollars for the widow and her orphaned children.

Such societies formed the core of our brotherhood, when they provided an insurance program to meet the needs of the railroad workers.

At that time in the history of our industry, every man who had been at work a few years either had lost a finger, a hand, an arm, or a foot—or expected that shortly he would contribute his personal tragedy to the demands of the man-killing industry.

Since then, we have come a long way. Many laws, State and national, have been passed to protect both the public and the railroad worker. The railroad brotherhoods have played a vital role in helping to get these laws passed. Our contracts of employment have traditionally paid attention to safety of equipment and operation.

At the present time, my organization is engaging in collective bargaining with the New York Central Railroad in an effort to bring an improvement in the cabooses used on the freight trains of that great railroad.

Today, the average freight train is twice as long as it was in the 1920's when 80 cars was considered a long train. Trains of 200 cars are common today; and trains of 300 or more cars, stretching 3 miles into virtual invisibility, are not uncommon. The average weight of these trains is double today over the 1920's, and frequently they reach

speeds double the previous rates, on parts of their runs, with as many as 10 locomotives pulling the train.

The cabooses we are complaining about on the New York Central are mostly of the wooden variety, designed for the trains and speeds of the early part of this century. We are asking for safety belts, padded seats, overhead rails for hand support, and steel cabooses.

These circumstances alone should indicate the increase in the hazards of operating trains. A gradually increasing accident rate has plagued the railroad industry since the 1930's—an increase that has continued through the period of dieselization of the railroads, and the introduction of new mechanical and automatic devices continually introduced. As a matter of fact, the accident rate per million miles for the whole last decade of steam power was 5.76, a rate that rose to 7.71 in 1956, one of the first full years of the diesel era—or 33.9 percent over the steam era. At the same time, as this Conference has shown in previous publications and will show in current meetings, the accident rate of industry generally has been declining in this country.

An important part of this accident rate is that involving grade crossing accidents—and we are becoming increasingly concerned over such accidents. With motor vehicle registration rising, and the activity of trucks increasing on the Nation's highways, we must devote direct effort to reducing these accidents.

The horror of grade-crossing accidents, particularly when trucks carrying flammables or explosives collide with a train, or a bus or private vehicle carrying school children is involved in a train accident, is unimaginable. These cases of mass tragedy make it mandatory that safe practices and procedures be put into practice.

The public does not realize the danger of racing a train to a crossing. The engineer, or any other man in the cab of the engine, frequently cannot stop his train in time to avoid a collision, even though he might see a vehicle approaching on a collision course. It takes a great deal of distance and an appreciable amount of time to stop these big trains, even when they are moving at slow speeds.

We must have a program of safety aimed at eliminating the causes of these accidents. We should answer a lot of questions—for instance: Is the crossing adequately marked? Are all truck and bus drivers fully aware of the need to stop before crossing railroad tracks. Are the laws applying to grade crossings uniform so that drivers can be trained all over the country in one program to drive safely over railroad tracks? Do we need special rules for drivers of trucks with flammable materials, and for bus drivers?

I will appear soon at an Interstate Commerce Commission hearing on this subject, where I will point out the need for developing this information, and for designing rules of safe motor vehicle operation.

We must also decide whether or not we need national legislation to install a uniform code of grade-crossing operation. If so, then a program of driver education must accompany this legislation, so that our drivers develop a uniform pattern of safe approach and crossing of railroad tracks.

The Railway Labor Executives' Association has recently adopted a resolution which I feel points in the right direction—they have asked the Interstate Commerce Commission to recommend to the Congress, to the States, and other appropriate governmental agencies, that grade crossings be eliminated where possible, and that full protection be provided where elimination is not possible.

RLEA has asked that the ICC recommendation include a provision that expenses incurred by the railroads, over and above tangible benefits received, be borne by the public, and that the carriers be reimbursed for the substantial expenses necessary to further such a program.

With the steady increase in the number of motor vehicles on our public highways, and the expansion of the Nation's highway system, the problem becomes extremely urgent—a solution is needed now to permit the future to show an improvement in reducing this type of accident.

Since rail-highway accidents kill and injure others besides railroad workers and passengers, the steady climb in this type of accident is ample reason for the general public to show more concern about reducing railroad accidents generally. In fulfilling this need of the general public, I believe that labor and management have a duty to perform—they must lead the way and provide the means by which the public's interest in safety on the railroads is implemented by a program that will reduce accidents.

I must at this point express disappointment at the action of railroad management in our early approaches on this very issue. Railway Labor Executives' Association some time ago proposed a joint labor-management safety committee. Flat refusal of management must be considered both heartless and foolhardy.

Look at the facts—loss to the railroads in terms of personal injury claims is \$100 million a year; loss in terms of damaged shipments is another \$100 million a year. Such a waste in human life and economic production must arouse in the hearts of the people of management the desire to recover as much as possible of the tragic waste.

You will recall that I said, when I began to talk, that this is a wel-

come departure from tradition, as far as railroad workers are concerned. It was this effort to establish a labor-management committee that I had in mind at the time. We are happy with this Conference because it provides a route to cooperation such as we have been seeking—and we are ready now, as always, to combine our efforts with management in a joint committee to make safety and safe practices an integral part of the railroad picture—and to promote the public's interest in safe operation of the Nation's most vital public utility. I will have more to say about the joint committee in a minute or two.

A more constructive approach was taken by the Association of American Railroads when it dropped its long-standing opposition to railroad labor's efforts to put the reporting of railroad accidents on the same basis as that used by industry generally.

The result is that four major changes in accident reporting rules for the railroads have recently been put into effect.

These are the changes:

1. Accidents to *all* railroad employees must now be reported. Previously only accidents to a portion of railroad employees were reportable, and certain occupational groups were excluded.

2. Now, accidents serious enough to incapacitate an employee 24 hours or more must be reported—previously, accidents were reported in the railroad industry only after 72 hours of incapacitation. (General practice in major industry is to report accidents on the 24-hour basis.)

3. Previous permission granted to the chief medical officer of a railroad to determine whether "doubtful" cases should be reported has been eliminated—the result is that the responsibility is now placed on the railroads to report all accidents serious enough to prevent an employee from performing his regular duties.

4. Beginning in 1962, a separate report must be submitted for each reportable personal injury.

A joint labor-management committee is working with the Interstate Commerce Commission to make what changes may become necessary.

These changes in the reporting rules are only an essential first step toward safer working conditions on the railroads. We hope that, once the new and more accurate statistics are available, railroad management will recognize the real losses to the industry, and will move to reduce the mounting toll of accidents. I pledge again, without fear of contradiction, that railroad labor will respond wholeheartedly to any sound proposal for joint action in the field of accident prevention. Our invitation to the carriers for such action, while rejected by them, has never been withdrawn.

We are certain that through labor-management cooperation, sincere government interest, and with the participation of the general public, the accident rate can be turned downward and held on that course.

Unsafe surroundings and workplaces take a needless toll of human life and cause wasteful destruction of property.

Some of these conditions, such as weeds and other debris in railroad yards, are covered by law in some States. We hope that adherence to safe practices and principles can augment this legal control by safety cooperation within the ranks of management and labor.

Such laws cover existing circumstances—many of the laws cover future construction of the railroad plant; for instance, the provision in some few States that adjacent tracks be built at specified distances apart.

There is another area of safety that does not come under full legal control. That is the design of new equipment.

We are now engaged in lengthy hearings before the ICC on such a piece of equipment—the Hydroframe 60 car. The design of this car is such that, when two are placed together, the distance from the top of one to the top of the other is such that a man cannot step across as he is accustomed to do on conventional cars. Furthermore, the draw-bar, which provides the connecting link between cars, is so long that dangerous slack action is appreciably increased.

Now, we don't want to go into details of car construction here—but such failings of design could easily be avoided by checking ahead of time with the men who will handle these cars. We have seen new equipment designed without proper walkways, or with handbrakes so placed that a man cannot handle them without endangering his life and limb.

Since the success of this meeting depends on the participation of the audience in questions and answers, I don't want to take too long at talking. I'll try and sum up the position of the labor side of this railroad part of the panel with constructive suggestions.

Basically, two general suggestions will provide a firm ground on which to approach a whole new area in railroad safety procedure—labor-management cooperation on a high level to seek the heart of the problem and work for solution.

First, let us institute the labor-management safety committee.

Second, let us provide the Interstate Commerce Commission with the right to study accidents, classify them, and make recommendations (with the ability to enforce them) for elimination of accident-causing unsafe practices.

The labor-management safety committee should be empowered to make studies of the industry with the intent of establishing uniform practices of safety. This committee should also participate in acci-

dent investigation so that it might both aid the ICC investigators, and that it might speed changes in the industry that are proved necessary by accident investigation.

I propose a further duty for this committee: Let it be a clearing-house for new designs in railroad equipment.

Designs should be submitted to the committee for study from the standpoint of how the new item of equipment will fit into switching operations, train operations, and how it will meet the requirements of safe handling by the employees who must handle the trains and equipment.

Following this, it should be processed through the Association of American Railroads so that standards can be set up.

Then, initial production should be tested in operation, observed, and—if necessary—recommendations for modification should be made.

Instructions should be issued for the proper handling of any new equipment which has features that make it possible that railroad men could make errors of judgment in using the new equipment—either because of previously unused devices on the cars, or because of the radical nature of the new item. (Such departures in railroad practice as piggybacking of automobiles will bring strange new shapes to railroad rolling stock in the future—it will, that is, if management adopts the progressive view of the rest of American industry, and redesigns to meet the changing economic needs of our growing Nation.)

My second suggestion is clear—if investigation of an accident shows an inherent defect of design in equipment, then a proper change should be recommended and incorporated in existing and future equipment of the same type.

I would also like to recall, at this point, what is a third recommendation for improved safety—the resolution which the Railway Labor Executives' Association has adopted—that grade crossings across the Nation be either eliminated or fully protected, with the public assuming its proper share of the cost.

Railroad labor is ready to do its part to improve safety on the railroads—we know everyone else, management, the Government, the public, also has a vital desire to see safety improved.

Let us hope that this Conference is the first step to success for our industry.

CONTAINER HANDLING SAFETY IN LONGSHORING OPERATIONS

HARRY E. AVERY, *Assistant Manager, Personnel Services,
Matson Navigation Co.*

It is now some 31½ years since the Matson containerization program entered the initial operational phase. During the planning stage it was generally conceded that this radical change in cargo handling methods would, without question, substantially reduce the longshoremen's exposure to personal injury. Everything seemed to point toward such a conclusion—a large reduction in the volume of hand handling, partial elimination of some especially hazardous segments of the conventional cargo handling operation, and greatly improved cargo handling equipment. Theoretically, our safety department appeared set for a long ride on the "gravity train"!

The ensuing period of actual operating experience has not, however, been quite the bed of roses that was originally anticipated. We have encountered a wide variety of problems, many of them having a direct bearing on the personal safety of the men engaged in this work. It is true that containerization has done a great deal to reduce the volume and complexity of accident hazards heretofore associated with stevedoring operations—but not without some compensating increase in other problem areas. This has been especially noticeable with respect to the training of employees, particularly those men who have long service records in the industry. Such radical changes in equipment and work procedures are not always easily assimilated by the individual who is 50 years old and has spent 25 years of that time working cargo under the old conventional method.

In order to provide a basic understanding of all the problems involved it will be helpful, I think, to review briefly the entire history of our entry into the containerization field. However, since in this instance our primary interest is the relationship of containerization to longshoring operations, we will not attempt to discuss the associated trucking and warehousing activities which are, of course, an integral part of the overall container service. Our description of the Matson system is intended to cover only the operational and safety problems attached to the development of a large-scale container operation. This review, and the subsequent discussion of specific safety problems, are planned to demonstrate that a carefully designed and engineered container system will furnish operating personnel a golden opportunity to make container handling the safest possible method of transporting cargo.

Matson's container system was inaugurated August 31, 1958, in our West Coast/Hawaii trade, and was evolved in stages through a research study, engineering design and prototype testing, to its current operational status. The program was carried forward in a series of planned phases which would allow us to develop a complete commercial service and to evaluate the progress as we got further into a larger scale operation, modifying the system as necessary. This testing period allowed us to doublecheck equipment, evaluate customer acceptance, determine the adequacy of terminal and other handling facilities, and to assess the all-important labor factors involved, under conditions that provided a realistic basis for weighing these various components of the program.

Following is a brief description of the Matson container handling system, with particular emphasis on the various types of equipment which are peculiar to this operation.

Containers

The containers are 24 feet long by 8 feet wide by 8½ feet high, constructed of aluminum with a steel frame. These are designed to carry a load of 25 tons under all foreseeable conditions, both for over-the-road hauling and either on-deck or below-deck stowage aboard ship. Corner castings of the containers—top and bottom—are steel. They are designed to provide a maximum of self-alignment—both for positioning onto the securing cones on deck and for entry of the lifting beam engaging hooks. Container corner posts are designed to provide sufficient strength for six-high stacking of fully loaded containers.

Chassis

Ashore, the containers are transported on a specially-designed skeletal chassis. These are provided with a positive locking mechanism to secure the container to the chassis. For this we employ a mechanically linked, spring-loaded lock which engages the container in three places. It may be released by a manually-operated lever at either side of the chassis. Chassis brakes are automatically set when the air line to the tractor or hauling unit is disconnected. Containers may also be transported on railroad flat cars or standard flat-bed trucks.

Yard Hustlers

Shoreside terminal operations employ yard hustlers to transport containers on chassis between storage areas and ship's side. These are built to provide the operator with maximum maneuverability and are equipped with all the standard commercial vehicle safety features.

Of special interest is the revolving driver's seat which allows the operator to hook up or disconnect his air lines without leaving the vehicle.

Straddle Carriers

These are Clarke-Ross diesel-powered units with a lifting capacity in excess of 25 tons, a lifting speed of 36 feet per minute (loaded) and a travelling speed of 20 mph. They are capable of stacking containers two high.

Transtainer

This piece of equipment is perhaps best described as a bridge crane on rubber-tired wheels. It is designed to handle a 25-ton container to or from two-high stowage and with a hoisting gear which moves laterally as well as vertically. The dimensions are such that it can straddle a row of containers stacked two high, and still leave sufficient space for a chassis to be pulled underneath for loading. Likewise, it is used to straddle a string of flat cars and load or unload to or from chassis.

Gantry Cranes

The transfer of containers between ship and shore is effected by lift-on, lift-off gantry-type cranes. These are shore mounted, and employ a wide variety of special safety features in their operation. The hoisting mechanism is provided with a dual-braking system so that if, for any reason, the service brake fails to operate, the emergency brake will automatically be engaged. Each braking system is designed to control at 100 percent capacity of the safe working load.

Two limit switches, one service and one emergency, are incorporated in the lifting cycle mechanism. If a load overrides the service switch, the emergency switch will automatically cut-out to prevent the load from coming in contact with the boom. On lowering a container to the dock level, automatic braking action is provided to slow the downward motion of the load when approaching the chassis. Both ends of the boom are equipped with limit switches and spring-loaded bumpers to prevent excessive trolley travel.

An anti-swing device virtually eliminates any swinging motion of containers, irrespective of the speed of acceleration or deceleration. Hoisting wires are rigged in an inverted "V" which also helps to control sway and allows the crane operators to tilt the container if necessary. The latter feature becomes essential when the vessel has a list, either to prevent jamming the container in the cells, or to allow for proper seating on the container cones.

The operator is provided with a full-vision cab which even allows him to see through the forward floor of his enclosure. He also has

available two-way radio communication covering the ship, dock, office and marshalling yard in any combination.

Other features included in the crane design which meet, or improve on the standard of the General Industrial Safety Code of the State of California, are caged vertical ladders, gantry travel bell, high level illumination, track sweeps, expanded metal wheel guards, rubber feeler bars, and emergency stop buttons at pier level.

Lifting Beams

This device, which actually substitutes for the sling or bridle used in conventional cargo handling methods, is utilized for lifting the containers on or off the vessel. It is provided with guides which enable the crane operator, without manual assistance from the pier or deck level, to position it for engagement with the container. Two safety features are incorporated in the design to insure against faulty engaging of hooks into the container castings or a possible release of the hooks when the container is being hoisted. First, signal lights on the crane operator's instrument panel indicate whether or not all four hooks are fully engaged. Second, to prevent possible release of the container while it is being lifted, each hook in the lifting beam is spring-loaded in the vertical direction and moves downward relative to the beam when a container is hoisted. As the hook moves relative to the beam frame, a lug on it passes through a slot making it mechanically impossible for the hook to disengage, even if the release button is accidentally activated in the crane cab.

A personnel carrier, capable of seating four persons, is installed on top of the lifting beam. This was designed to minimize the use of portable ladders for longshoremen who have to affix lashing equipment atop containers which are stacked two-high or more on the deck or in the hold of vessels. All standard safety features are provided, including double railings, toe boards, seats, and machinery guards. When used for carrying personnel, the beam must be free of load and the speed of operation, both vertically and laterally, is limited.

Ships

We are now using the following ships in our container service: six C-3's, equipped to transport containers in on-deck stowage only, each with a maximum capacity of 98 containers. Two partially converted C-4's which are designed to transport bulk sugar, molasses and containers. On the westbound leg of their voyages these vessels will handle up to 338 containers, utilizing both on-deck and in-the-hold stowage. Eastbound from Hawaii they can be booked with 16,400 tons of bulk sugar and at the same time transport as many as 262

containers, 152 of which may be fully loaded. One C-3, which was completely converted for carrying containers only, has a maximum capacity of 436 units.

Not considered a container vessel, but certainly a part of our overall containerization-mechanization program, is the *Hawaiian Fisherman*, another C-3 which was converted to transport automobiles only. This ship can carry up to a maximum of 517 cars, the exact number being determined by the mix of standard and compact models.

Since this discussion is mainly concerned with accident prevention techniques, the remainder of our remarks will deal with on-deck stowage of containers, as it was in this area where a majority of the aboard-vessel safety problems were encountered. These comments can, however, also be applied to under-deck stowage of containers on the two C-4 vessels where the same methods of stacking and securing are necessary.

In order to achieve maximum vessel capacity it is necessary to double-stack containers at most on-deck locations and to triple-stack at some others. Also, some in-the-hold stowage on the C-4's calls for four-high stacking.

Securing containers on deck is accomplished by means of spotting the lower tier onto cones welded to the ship's deck. They are locked in place by inserting a round bar, called a lock pin, through the lower corner of the container and a hole machined through the cone. The pin is then rotated 90°, which positions a lug on one side in such a manner that the pin cannot become disengaged, either by vibration of the vessel or through working movements of the ship or container.

Containers loaded to the upper tier are positioned on portable cone fittings inserted into the top corner post castings of the bottom containers and are secured to the adjacent row of containers by means of a bridge fitting. To prevent shifting or overturning, the uppermost containers are also secured by quick-acting tension lashings which run from the top corner castings of the container to padeyes on deck.

Raising and lowering of lashings, portable positioning cones and bridge fittings to or from upper containers are performed either manually, by securing a light manila line to the fittings, or by having them hoisted in the aforementioned personnel carrier constructed on top of the lifting beam.

Portable ladders, equipped with rubber safety shoes and provided with right angle outrigger arms to prevent side slipping, are used for longshoremen's access to the tops of the first two tiers of containers. When any employee is ascending or descending, a second man is assigned to hold the lower part of the ladder. The personnel carrier is used to transport workers to higher-level tiers of containers.

Men assigned to secure tension lashings to the top tier of containers are required to work at heights of from 17 to 34 feet, and the manner in which the lashings must be made fast obliges them to work at the immediate outer edge of the containers. To prevent falls, a portable strap which can be adjusted to span from one to four containers is installed across the top center of the tier. This strap hooks over the eaves of the outside rows of containers and is tension-secured by a ratchet device. "D" rings are provided at proper intervals on the strap and standard waist safety belts are worn by lashers. Safety lines are secured to the "D" ring on the strap, and the employee's safety belt. During foggy or rainy weather, all men assigned to these areas are provided with nonskid rubber overshoes.

In order to expedite ship turn-around, a substantial volume of container loading and discharging is performed during hours of darkness. This operation presented some really difficult problems with respect to providing adequate illumination, particularly for those longshoremen assigned to lashing duties on the deck of the vessel. High tiers of containers made it virtually impossible to furnish sufficient lighting in all the areas where men were required to work. After a thorough study and numerous tests, it was determined that the most efficient solution to this problem was to furnish each employee with his own personal temporary light. All longshoremen assigned as lashers had been encouraged to wear hard hats provided by the company, although we could not force them to do so, and there was, as we expected, considerable resistance at first. Now, however, to solve the lighting deficiency, we furnished a standard miner's lamp which could only be attached to the hard hats. This accomplished a dual purpose since it not only provided excellent illumination, but also gave the head protection we felt necessary for this operation.

Summary

In summarizing the foregoing description of Matson's containerization system, we must emphasize that it is extremely sketchy and many of the problems encountered are given only the briefest coverage. We could, for example, have spent at least half the allotted time on a complete rundown of our efforts to provide suitable protection from falls for the longshoremen working on the top tiers of containers. The variety of methods which were suggested, studied, tested and rejected as a means of accomplishing this were much too involved to dwell on in detail.

We must also point out that while much of the equipment we have described—gantry cranes, yard hustlers, straddle carriers, etc.—is, with some variations, fairly standard in many industries, it was cer-

tainly new to stevedoring operations. And, what is more important, that every bit of it is operated by longshoremen who were trained in its use by our company. We could not call upon an operating engineer to handle the cranes, and the only specific qualification for those men who were eventually trained in their operation was that they must have formerly been qualified as winch drivers. That there is a radical difference in driving ship's winches on the conventional burtoning gear method of cargo handling, and in operating one of these giants is self evident. Straddle carrier and yard hustler drivers came to us off what is termed the "combo board," that is, longshoremen who had qualified as lift-truck operators. Again, we were faced with the not inconsiderable problem of training men to operate equipment which was, for the most part, totally strange to them.

All in all, we can now look back on this training program as eminently successful, since everyone—longshoremen, operating and staff personnel alike—came through in one piece. However, I can vouch for the fact that a good deal of mental scar tissue was accumulated by all concerned!

Finally, let me reemphasize what was said earlier—containerization or mechanization is in itself no guarantee of a safe operation. New work methods and new types of equipment will invariably bring with them new problems in the field of accident prevention.

These are problems which can be overcome, but not without intelligent planning, competent engineering, adequate training, thorough preventative maintenance, and reasonable cooperation on the part of labor and management alike.

SAFETY IN STEVEDORING

JOSEPH LEONARD, *Safety Director, International Longshoremen's Association*

This safety conference is evidence of the sincere interest and concern that the President of the United States and the Secretary of Labor have in the promotion of occupational safety in all industries throughout the United States, and I want to express my appreciation for the invitation I received to address this Committee.

As Safety Director of the International Longshoremen's Association, it is my responsibility to protect the life, limb, and health of over 100,000 of our members who are engaged in the stevedoring industry in all ports on the Atlantic and Gulf coasts as well as those employed on the Great Lakes, Canada, Puerto Rico, and the Caribbean.

Stevedoring and longshoring, the loading and unloading of ships' cargo, is nothing more or less than *materials handling*.

The major difference between stevedoring and the more common concept of the materials handling industry is *danger*. Stevedoring is the most dangerous occupation in the United States.

For the benefit of some of you who may not be familiar with our industry I will try to help create for you a better understanding of the urgency of our problems.

The work of a *test pilot* is safer than our occupation. The records prove that longshoremen's work is more dangerous than the commonly recognized hazardous occupations such as coal mining, steeple jacking, bridge building, logging, etc. Longshoremen suffer *1,200 percent more injuries* than do the workers engaged in our national manufacturing industry.

Congressman Zelenko underlined the facts when he said: "Every other day a worker loses his life on our waterfront."

Now you can perhaps better realize why I feel the weight of my responsibility. Now you can better understand why I am so pleased to be here to address President Kennedy's Conference on Occupational Safety.

President Kennedy is well aware of our problems and he has always tried to help the longshoremen. As a matter of fact, he has not only expressed his personal concern, but he has actually done something about it.

I first met the President when he was a member of the House of Representatives. He had been made aware of the high accident rate in stevedoring work so he came to New York and visited our piers to see for himself! The ILA officials and members in the ports of Boston and Philadelphia were pleased to accompany President Kennedy when he also visited their piers.

President Kennedy is not new to the docks and neither am I. The Leonard family is one of the oldest names on the waterfront. I am the third generation to work as a longshoreman. My grandfather worked with "the Hook" and my father raised his family by the sweat of his brow on the piers of New York. As a boy I played on or about the docks and I have worked as a longshoreman for over 34 years.

Therefore, gentlemen, my message to this committee will be the result of personal knowledge learned in the school of hard knocks. We of the ILA have long realized that our work was extremely hazardous and that the future of our wives and children depended upon our being alert and safety-conscious. Personal safety has long been a byword among longshoremen! Our president, Captain Bradley, personally has spent much time and effort trying to improve safety for his men. Our beloved "Packy" Connelly spent many hours here in Washington before various committees fighting for safety

laws. All concerned will remember the wonderful job that our research director, Johnny Condon, did in digging out the facts and figures for our many appearances here trying to get Federal laws for the protection of longshoremen. Our executive vice-president, "Teddy" Gleason, has not only fought for safety at the local level but he has carried his fight to the national and international bodies.

Nevertheless, the accident frequency rate steadily increased to the point where we sought cooperation from management to aid us in developing a positive and effective safety program. Our efforts always met with the same result. Either they were rejected outright or resulted in a program of "lip service" instead of safety.

The ILA was the main supporter of the Department of Labor's efforts to get some legislation through Congress, but management associations on the Atlantic and Pacific coasts always blocked the legislation in committee. These associations successfully defeated our efforts, and the efforts of the Department of Labor, by claiming that their voluntary safety codes were effective, yet the accident frequency rate kept increasing and it was not until President Kennedy introduced his bill did we really have a chance.

When the Kennedy bill was presented, the ILA went all-out and with the aid and assistance of other labor unions, Public Law 85-742 was passed by Congress, again despite the opposition of the New York Shipping Association and the Pacific Coast Management Clubs.

Public Law 85-742 was signed by President Eisenhower on August 23, 1958. This legislation placed upon the Secretary of Labor the responsibility as well as the authority to require the employers of dock workers to provide a safe place of employment.

We of the ILA who had fought in vain for so many years now felt our fight and suffering were over. However, this was not to be. It took the Department of Labor over 2 years to develop regulations which did not come into effect until September of 1960.

We cannot feel that the Department of Labor has successfully carried out the intent of President Kennedy when he authored the bill, nor do we feel they have carried out the intent of the Congress that passed the legislation.

Why do we feel let down? Let us look at the total picture. The ILA has repeatedly stated that we were willing and anxious to cooperate in every way possible with the Department of Labor or any other agency which would help us promote a safer place of employment for our members. Yet when we ask for cooperation from the Department of Labor we are turned down! Here are some of the facts:

(1) *Naphthalene*: Despite repeated requests for action from the International Longshoremen's Association, the Department of Labor

and the U.S. Coast Guard have refused to establish a rule against stowing naphthalene in the deep tanks of ships. We have pointed out that this hazard has already been recognized in the port of New York by an agreement between labor and management that no ship will be permitted to enter New York harbor with this cargo stowed in the deep tanks. What are they waiting for? The ports of Boston and Philadelphia were almost blown up by ships carrying this cargo.

(2) *Forklift Trucks*: We have repeatedly pointed out to the Department of Labor the hazards of fire, explosion, and fume poisoning which could result through the use of gasoline-powered forklift trucks in the confines of a hold of a ship. Recently seventeen longshoremen in Philadelphia suffered fume poisoning as a result of the Department of Labor's lack of proper standards or provisions for the use of gasoline forklift trucks. The Department of Labor doesn't seem to understand yet what the late Senator Robert Taft stated during the hearings: "Every employer should keep the holds free of gas."

(3) *Pallets*: Pallets of all sizes, strengths, and dimensions are being used in every port in the United States. Their failure creates completely unwarranted hazards to our members. The ILA has repeatedly requested the Department of Labor to provide design and safety factors for the construction and maintenance of wooden pallets. However, the Department of Labor has thus far not seen fit to develop or recommend these standards.

(4) *Stevedore Carry-on Gear*: The longshoremen are forced to use the gear provided by the stevedore contractor. This gear is in most instances used in conjunction with the ship's gear. The ILA has repeatedly requested the Department of Labor to implement the same requirements for the carry-on gear as the same gear is subjected to when maintained aboard the ship. However, the Department of Labor has exempted this gear from testing, inspection, and certification.

(5) *Tanker Cargo Gear*: Although cargo booms aboard tankers are frequently used by persons engaged in longshoring, ship repair, or terminal operations to load units such as pumps, compressors, etc. which weigh in excess of the normal working capacity of these booms, the Department of Labor has exempted all tanker cargo booms from the regulations of Public Law 85-742.

Stores booms aboard tankers are utilized by longshoremen for the loading and discharging of ships' stores, yet the Department of Labor has also exempted this equipment from the regulations.

(6) *Floating Derrick Barges*: Cargo loaded or unloaded by floating derricks is the exclusive work of the ILA members. These cargoes sometimes exceed 100 tons in a single unit. Our men frequently work under these loads yet over our objections the Department of Labor has

exempted some of this equipment from their regulations. Within the last couple of weeks one of these derrick barges had a material failure which caused the boom to go crashing right through the operator's cab—10 of our men narrowly missed being killed. I hope this proves to the Department of Labor that stringent enforcement is badly required.

(7) *Dangerous Cargoes*: Our members are repeatedly exposed to serious hazards through the loading or discharging of dangerous cargoes such as radioactive materials, castor beans, dust or fume generating cargoes, and yet the Department of Labor refuses to take a positive position in this most hazardous area.

(8) *Sanitation and Health*: Our frequent requests for improved sanitary facilities have all but been ignored by the Department of Labor. Longshoremen must work aboard American ships as well as foreign ships. If we take a realistic look at our depressed American Merchant Marine we will recognize the common deteriorated, neglected physical condition of the gear which our members must use in the loading or unloading of these vessels. Basically speaking, most of the existing American flag tonnage was built during World War II in an emergency to provide a lifeline of supply for our Allies and our overseas troops. Today these same vessels which are the bulk of the American Merchant Marine have reached the age of replacement by most standards. As for the foreign flag ships other than liner services, most cargo vessels are just "old rust buckets."

Yet when we request a more effective inspection from representatives of the Department of Labor to correct these unsafe working conditions aboard American flag vessels they tell us that they cannot come in conflict with the authority which the Coast Guard is supposed to have over all American vessels. Yet many of our American flag vessels in an effort to avoid difficulty and delay are currently complying with the national regulations of foreign countries. When we solicit the same effective inspections aboard foreign flag vessels the Department of Labor says that for political purposes they must recognize certificates issued abroad even though they themselves question the validity of these certificates.

When we realized that they were getting around shipboard safety we concentrated our efforts to see what could be done to promote greater safety on the docks. Do you have any idea of the answer we got from the Department of Labor regarding this area? The Department of Labor states that it cannot be of much help to us on the docks because the docks fall within the authority of the individual States. Therefore, gentlemen, although Public Law 85-742 was intended for the protection of dock workers, the current situation is

that the Department of Labor has no authority or responsibility on American flag vessels, foreign flag vessels or even on the docks!

We frequently are advised that vessels leaving American ports flying either an American or foreign flag are being rejected in Canada, India, England, Israel, etc., and we cannot quite understand why a life in any one of these countries is more valuable than the life of an American longshoreman!

So you see the only area where the Department of Labor feels it can actively carry out the intent of the legislation is in the educational program. There they try to teach the longshoreman something he has known all his life: namely, that it is the injured person and his family who suffer most when an accident occurs.

Public Law 85-742 has cost the taxpayers of the United States a lot of money. How much I do not know but I have heard that it runs into the millions. Yet in spite of the expense of these vast sums, the insurance companies still feel a longshoreman is a bad risk. Perhaps the article which appeared in the *Journal of Commerce* on February 14, 1962, better describes the current situation. Mr. Andrew Schmitz, head of the Pacific coast area for the Bureau of Labor Standards, U.S. Department of Labor, is quoted as saying: "A significant increase in injuries to longshoremen has been reported for the first nine months of 1961 over the same period last year." The article further quotes Mr. Schmitz as saying: "Increases in San Francisco and Hawaii were up 20 percent."

Increases in other west coast ports range from 11 to 17 percent. Of course some ports, like New York, where I am most active, showed a reduction but we cannot forget that ports like Philadelphia are up 32 percent and Chicago which is up 129 percent or the Great Lakes area in general which is up 29 percent.

WORKSHOP: CONSTRUCTION SAFETY

Moderator: GERARD O. GRIFFIN, *Manager, Hazard Control, Dravo Corporation*

MR. GRIFFIN. Today is Ash Wednesday. I see that some of you visited your church and the cleric has made a cross on your forehead with ashes to remind you—"Man, dust thou art and to dust thou shalt return." We remember this for a day or two, and then are inclined to forget in the press of day-to-day duties, other sorrows and pleasures.

But 1,980 families this year, won't forget. The ashes are so real to them that they can taste them. I refer, of course, to the families of 1,980 employees in the construction industry who died in construction accidents in 1961. In addition to these 1,980 employees, there were some 500 nonemployees, contractors, self-employed, partners, etc., who similarly lost their lives.

In the last 10 years employment in the construction industry has ranged from 2.3 to almost 3 million in 1959. Disabling injuries have ranged from a low of 158,000 in 1958 to a high of 185,000 in 1951. Some improvement, but not much.

In days of lost time, it's pleasing to see that 1961 had the lowest total since 1949. However 17.7 million days lost time is a lot of days to take from an industry with the increasing percent of failures we have in construction. Again, let me remind you, these totals do not include the proprietors and self-employed.

We are here today to see what we can do collectively to reduce these totals. To see if buildings can be erected, highways built, and rivers spanned in the future with a little better quality of concrete, unmixed with blood.

My company, the Dravo Corp., is in several kinds of business. We do heavy construction, and we are mechanical constructors. We have a subsidiary that sells and rents construction equipment. We build ore bridges, coal unloaders, sintering and pelletizing plants, manufacture heaters, steel grating, fabricated piping, build towboats, barges and tugs, and repair them. We dredge sand and gravel from the rivers, sell ready mixed concrete, concrete block, building supplies, do miscellaneous river towing and operate a barge line from Pittsburgh to New Orleans. This may sound like a commercial—



Workshop on Construction Safety, Gerard O. Griffin, Moderator.

but I'm merely trying to portray to you that we have a variety of accident hazards and safety problems.

After a great deal of study, some vacillation, some changing of my position back and forth, I've come to the conclusion that safety problems throughout all our divisions and subsidiaries are the same, with two exceptions. (1) Some divisions have a drowning hazard and some don't. But, after all, drowning is just a special kind of a fall. I suppose we could set up a situation where a man could drown without falling off of something; however, it would be exceedingly difficult. In general, I think we can say, if we could prevent the fall, we wouldn't have the drowning. (2) The other exception is tunnel construction. For reasons which are physically obvious, tunnel construction has certain inherent hazards which do not seem to be amenable to the normal types of accident prevention; at least we have not been able to completely conquer them, although we have done better than some.

So, in general, it is my opinion that "Construction Safety Ain't Different."

We do, however, have two special problems which contribute to our high injury total. (1) Every new contract is like a manufacturing company starting to build a new plant. We move in, frequently on a virgin site, and have to unload our equipment, build temporary buildings, bring in telephone, power and water lines, find a place to store gasoline, oil, dynamite, stuff all this, and get producing in time to

have at least a fairly sizable estimate at the end of the second month. (2) About the time we have a pretty good staff, picked out some good foremen, and have everybody started under some sort of safety training and are beginning to get some good results, the job is over, we leave the locality and all these good people, and get ready to do it all over again somewhere else.

So, in my opinion, the two major differences in construction safety are: (1) Every contract is like starting a new company and (2) we don't retain people in our employ long enough to train them well.

I'd like to introduce the members of our panel, and let you see how different they think construction safety is.

CONSTRUCTION SAFETY

G. R. COLLINS, *Vice President and Director of Construction, Lummus Company; President, National Constructors Association*

The very nature of the construction industry with its variety of projects both in scope and location, its itinerant and locally acquired workers, has developed the fallacy that construction safety is different.

This fallacy has created in the minds of many that construction poses an entirely new concept of safety application of insurmountable proportions—that what holds true for other industries does not hold true for construction.

This has resulted in a passive resistance to safety which is unobtrusively passed on to the workers and is reflected in their working habits. This same passive influence may often create an erroneous idea that safety in its application to construction hinders the progress of the job and increases costs.

As a result, segments of the construction industry for many years have dealt with safety in an indirect and haphazard manner, largely through trial and error.

Let us examine the nature of the work or the so-called differences:

The construction worker *is* often itinerant, construction work *is* often of short duration and in different locations, there *are* problems in engineering, in material delivery, and bad weather *does* cause delays and lay-offs. These are peculiarities inherent to the industry. But they do not make construction safety different. These problems and others merely make construction safety more difficult to implement and to administer.

Once we have acknowledged this fact we are on the road to resolving the problems which encumber our approach to construction safety.

To begin with, safety in any business or industry must begin at the

top. Management must not only *want* a safety program but must make this fact known to its employees at all levels. The worker, regardless of trade or craft, will follow safe practices if he knows what is required of him, is given adequate follow-up, and is provided with safe tools and equipment and instructed in their use.

Our safety message must be gotten to the worker faster and with more emphasis; he will not be with us long enough to be gradually indoctrinated. We must hit fast, hard, and often.

In order to overcome effectively the inherent safety problems in construction we must have:

1. A comprehensive and well developed safety program ready to apply to all levels from top to bottom.

2. Advanced planning which must originate at management's top level and during the early planning of the work. This pre-planning feature will cohesively bring engineering, procurement, and construction into play long before the job gets started.

3. A program effectively implemented in the field by top management in the field. Field management can do this only if this level of management itself has been properly indoctrinated in all aspects of the safety program and its methods of application. Without this understanding, acceptance and enthusiasm on the part of field management, there cannot be effective safety in the field. Field management, in effect, must complement its efforts in the implementation of safety by developing this same understanding, acceptance and enthusiasm in the supervision at all levels on a continuous day-to-day basis.

One of the tools with which field management can best accomplish these ends is the field safety engineer. The effective use of the safety engineer requires that he be given complete support from field management so that he can properly perform his basic duties, such as:

- A. The organization and maintenance of weekly safety meetings.
- B. The conduct of daily tours of the site to insure safe performance of the work. In this connection, the field construction manager will add to the importance of these tours if he himself makes them on a routine basis, either with or without the safety engineer.
- C. The prompt investigation of all accidents and recommendations for the prevention of similar accidents in the future.
- D. The recommendation as to type and quantity of safety equipment required.

Although the safety engineer is an effective tool, his success in accident prevention will depend largely on the efforts and cooperation of those who are directly in charge of the men who are doing the job. A large part of accident prevention lies in the area of human relations.

4. Therefore the fourth point that we must consider to counter ex-

isting problems is that the foreman's interest in safety must be fully developed. The worker's attitude and compliance depends largely on the attitude of the superintendent and the foreman. If the foreman is indifferent, the men will be indifferent, but if he believes in safety, his actions and words will convince his men that he is determined to have safe work practices followed—then his men will respond accordingly. The foreman on the job must be reminded periodically of things he already knows about safety in order to insure the job methods which are best, not only from a production standpoint, but also from the standpoint of safety. Eventually, one will be dependent on the other.

5. Proper indoctrination for craftsmen through orientation sessions at time of employment which will inform the workers of safety rules, regulations, and the facilities at their disposal.

6. A recognition of the direct and *indirect* costs of accidents. Contractors, by the very nature of their work, are cost-conscious, but their approach to savings is paradoxical. When compiling an estimate of cost, safety protection costs are often arbitrarily cut in an endeavor to be low bidder. Apart from insurance costs, accident costs are partially intangible; therefore, the savings gained from the nonoccurrence of accidents are never fully appreciated. But no one can contradict that a properly supervised safety program and the prevention of accidents pay dividends.

As to the indirect or hidden costs, there are many noninsurable costs due to accidents. They are elements in the contractor's overhead beyond the cost of insurance. These indirect costs are often many times greater than the compensation and medical payments. Some indirect costs due to accidents are:

- A. Damaged tools and equipment.
- B. Interrupted work and subsequently prolonged schedules.
- C. Spoiled work that must be replaced.
- D. Lost time by foreman and other workmen.

When management fully recognizes the direct and indirect costs of accidents and how they affect the work's progress, the inherent safety problems of construction will be better controlled.

7. The last point is the role of the subcontractor in the application of safety. Some construction companies do most of their work on a direct labor basis and only subcontract small portions of their work, while others subcontract most of their work and reduce their direct labor work to a minimum. In any case, the relationship of the subcontractor to the work is one of the special features of the construction industry which requires special consideration and attention. The subcontractor's role in his relation to safety application should be well defined. The prime contractor should not disengage himself from the

subcontractor's conduct of safety application to his work. In order to maintain adequate control, the subcontractor must submit to the prime contractor's safety regulations and methods. It can only be done by making this a rigid condition of his work contract. He should also be given explicit information covering this aspect of the work which will tie in with, and form part of, the contract itself. In order that the contractual condition be effective, the language should be such that it conveys, in meaning, the same importance given to other stipulations of the contract.

The contractual condition, in itself, however, is not sufficient to make the subcontractor comply effectively. He should be thoroughly acquainted with the prime contractor's methods and procedures of safety application. He should also take an active part in all safety meetings and discussions and be integrated in the overall application of the safety program.

This integration of the subcontractor into the overall safety program has become more and more important since it is a well-known fact that his accidents and ineffective safety measures affect the prime contractor's operation of his own safety program; affect his relationship with the client by the creation of an adverse public relations climate for the area, for the client, and the prime contractor as well.

The subcontractor's efforts to reduce costs and meet schedules are often at the expense of adequate safety application and protection. It is not always done with intentional disregard. It is usually done with reservations, but it is always a form of self-deception. The effect of this approach is not only a cost risk to him, but to the prime contractor and client as well. The end result, invariably, is increased costs and delayed schedules, broadly affecting the work as a whole.

The effect that integration has for the subcontractor in the long run is that it not only makes him more adaptable for future work with other prime contractors, but it also develops in him a safety-mindedness and an awareness which is for the common good. As more and more subcontractors are brought into the fold, a greater number of craftsmen become more and more prepared in complying effectively with established and comprehensive safety programs so that the temporary nature of the worker and the known hazards of construction no longer pose a problem. This action will also dispel the fallacious thinking that safety in construction is different.

Much groundwork has already been done in the direction of better application of safety in construction. One of the means by which this improved and better application can best be accomplished is through association and group efforts where there is a free exchange of new and challenging ideas.

Better and improved application of safety in construction is the concern of the entire construction industry. The National Constructors Association, which I represent, has made great strides in safety development and administration since the organization of its accident prevention committee in 1953. For the year 1960-61 our association's frequency and severity figures were 16.2 and 1,583 respectively. The National Safety Council's national averages for frequency and severity in construction work were 18.11 and 2,267 respectively. NCA's rates look good. We are below the National Safety Council's average rates, but we did have 10 fatalities and 965 disabling injuries. We may say that due to the nature of our work these statistics are good. Are they? Could the number of fatalities and disabling injuries be reduced? I say *yes!* But only through a well thought out, management-directed safety program. One which will eliminate, through pre-job and on-job planning, many of the areas in which these fatalities or disabling injuries occur. A program which will not only educate the worker as to his place in the safety scheme of things, but make him his brother's keeper as well as his own. This may not eliminate fatalities and disabling injuries, but it will go a long way toward getting to a no-accident safety record. Individually, many of NCA's member companies have profited in many ways from the activities of NCA's accident prevention committee. As a result of NCA's interest in safety, all member companies have been able to reduce their frequency and severity of accidents. Safety features and new concepts have been developed to enable the individual companies to apply their safety programs with greater success to the rank and file of the construction job.

The construction industry today has gained respectability and recognition through integrity and an important part of this integrity is an active concern for the worker's life and limb.

CONSTRUCTION SAFETY

FINLAY C. ALLAN, *Second General Vice President, United Brotherhood of Carpenters and Joiners of America*

I would like to begin by thanking the planners of this 1962 President's Safety Conference for giving me the opportunity to participate in this discussion of construction safety. In one way or another my whole working life has been spent in the construction industry. As a journeyman carpenter, I've seen far too many friends and fellow workers seriously injured in on-the-job accidents. Later on, as an officer of my local union and building trades council, I have too often

been in a position to see some of the effects of accidents on workers and their families. And in my work for my international union in recent years, safety activities have been an important part of my responsibilities. So I do feel that I have a genuine and serious interest in construction safety.

We are here today because it is felt that the accident and injury problems of certain non-manufacturing industries justify particular examination and emphasis at this time. Construction is one of those industries; and, as I see it, our job is to make an objective review of our progress in accident prevention.

First, I would like to take a quick overall look at the construction industry, its problems, and its accident record; Then tell you something of the program that organized labor is undertaking to develop safety knowledge and attitudes in its own ranks, to enlist the cooperation of management in preventing accidents, and to promote legislation which will set up effective standards and enforcement procedures under which management and labor can work together to make every job a safe job.

I'm sure that this audience is will acquainted with the construction industry and in need of no elaborate preparation for a discussion of its safety problems. You are fully aware that construction is in every sense one of the country's major industries. Currently new construction is being put in place at a rate of almost \$60 billion per year. And the estimated \$21 billion to be spent on maintenance and repair work is expected to bring total construction in 1962 to more than \$80 billion.

You also know that, unlike most of our major industries, the business of construction is carried on by a very large number of relatively small contractors. This fact has serious implications for safety. Large firms with ample resources are in a much better position to take the long view and make the small investments in safety that they know will pay for themselves many times over. Although many small firms are very safety-conscious and have excellent safety records, the small contractor is more likely to neglect his responsibility and underrate the long range value of safety—and his employees suffer accordingly.

Moreover, the very nature of site construction presents unique problems in accident prevention. Each individual job creates safety problems to some extent different from those on every other job. Such basic physical conditions as weather, soil, and topography vary from project to project. And such features as size, type of construction, work methods, and available space for handling and storing materials

all play a part in determining the hazards to be found on a particular job.

But perhaps an even more basic difficulty is that the typical construction job just doesn't last long enough. Even a big job is usually completed in two or three years at most. Moreover, on the typical job, workers and supervisors come and go frequently as the work progresses from one stage to another. A good safety program, like any other program, demands teamwork; and teamwork is best built up over a long period of time. Thus, a manufacturing plant with uniform conditions and a stable force of workers and supervisors is in a much better position to develop and sustain a consistent program of accident prevention.

These seem to me some of the real difficulties that we have to face in the construction industry; and I think we should recognize them—but only for the sake of trying to do something about them. Certainly these problems are not a valid excuse for tolerating an accident and injury rate far above that of most industries.

This brings us to the question of just how well the construction industry is doing in preventing accidents. According to the latest figures of the Bureau of Labor Statistics, contract construction in 1958 had an injury frequency rate of 30.9. This represents some slight progress from the 1952 rate of 35.3—but it is still almost three times the current 1960 frequency rate for all manufacturing industries of 11.3.

Or to look at the picture from a slightly different angle; with the current employment of about 4 percent of the total labor force, the construction industry in 1960 accounted for about 11 percent of all disabling work injuries and about 17 percent of all deaths from industrial accidents. I'm afraid that we'll have to admit that this is not a record to be proud of. I don't think that any of us could honestly conclude that our industry as a whole is doing a very good job of preventing accidents.

Although these industry-wide statistics help us to define the extent of our problems, they do lack human significance for most of us. We tend to forget that these overall figures are only abstractions which represent thousands of individual tragedies. For emotional impact, one accident in front of your eyes is worth more than a barrel of statistics; but I think it may be worth taking a look at the figures for one small select group of current projects.

In searching for accident statistics for a small segment of the construction industry which could be used to illustrate the toll that accidents are taking, I came across a report on accidents on missile-site projects for the last six months of 1961. This is up-to-date in-

formation on a homogeneous group of construction projects of particular interest and importance to the general public. I hope it will help us to visualize just a little more concretely what on-the-job accidents mean in the construction industry.

On 15 missile sites scattered over the country, there was a grand total of 154 accidents leading to time lost from work of more than 70,000 man-days. This is bad enough—but 10 men died in those accidents. In some of the more spectacular phases of the defense effort, I'm sure that no expenditure of time and money on accident prevention is considered too great. I wonder if we can say the same of the projects where those 10 men were killed.

Now that I have given this very sketchy stocktaking of the industry and its safety problems, I want to tell you something of what we in the labor movement think needs to be done—and something of what we are trying to do.

For the past 2 years, the AFL-CIO Standing Committee on Safety and Occupational Health has sponsored annual conferences. From these conferences has come a three-point program which pretty well sums up labor's view as to what needs to be done and how to go about doing it.

The first point in this program is directed to achieving safety through labor-management relations. Surely the safety and health of our members and their employees is a legitimate joint concern of labor and management. Even a casual glance at the problems makes one thing quite clear: We can't do it alone; nor can our employers do it alone. That is why we are encouraging our local unions to inject safety into their collective bargaining. In particular, we feel strongly that the cause of accident prevention in a local area can be immensely stimulated by the formation of local joint labor-management safety committees. I hope that our employers are going to be hearing more and more from our local unions about safety and that they will respond to that interest in the spirit of working with us to make every job just as safe as humanly possible.

The second point in this program is aimed at achieving safety through education and training. We realize that training and education is the foundation of a good safety program. We need trained men at the international level, trained local leaders, and, as the ultimate goal, rank-and-file members who are trained to act and work safely and to insist that others do the same.

I believe that the most important aspect of safety promotion revolves around educating the workers themselves. There are many

people in many areas working on safety. There are people developing statistics to pinpoint hazards. There are inventors and engineers wracking their brains to come up with better guards and safety devices. But all their efforts go for nothing if the workers themselves fail to recognize the importance of adhering to the safety methods developed.

The best guard in the world is useless if the worker doesn't keep it on his machine. The pinpointing of a specific hazard by statistical proof means little if the worker doesn't follow the accepted procedures worked out by safety engineers to combat a particular hazard. All the safety devices and safety programs developed in the front offices fail if the workers themselves are not made aware of the need for following accepted safety procedures.

As the general shortage of teachers seems to extend to the field of safety, we are faced with the problem of developing teachers of our own. As one approach to this problem, the AFL-CIO has sponsored its first safety training institute over the past year and is now arranging for a second institute to begin in the near future. These excellent courses are taught by qualified safety engineers from the Bureau of Labor Standards of the United States Department of Labor. Sixteen students from my own union, the United Brotherhood of Carpenters, recently received certificates from the AFL-CIO and the Bureau of Labor Standards for completion of this 120-hour instructors' safety training course. We feel that these men constitute an invaluable nucleus for developing our own safety program.

The third point in this program is directed to achieving safety through legislation. We need adequate safety legislation at all levels of government to provide the necessary standards for the protection of all workers. And we are a long way from having such legislation. Few States have adequate safety codes; and even fewer provide enforcement that even approaches adequacy. Certainly every worker is entitled to the basic protection of an adequate code decently administered by a safety department with a sufficient staff of competent, well-trained safety inspectors.

This three-point program sums up the safety program of the labor movement. We in the building trades unions, as a part of organized labor, are doing our best to carry out this program in our own industry. In its recent convention, the Building Trades Department of the AFL-CIO took action to form a standing committee on safety comparable to that of the AFL-CIO. This committee will be charged with the function of working with the general labor movement in its

safety programs—and with formulating goals and policies on safety problems peculiar to the construction industry.

In our apprenticeship programs, most building trades unions have an opportunity to teach safe attitudes and safe work practices to the young men entering the various trades. As we feel that it is much better to teach good safety habits in the first place than to change bad habits, we try to take advantage of that opportunity. My own union, for example, provides a safety instructional unit which is taught as a part of our apprentice training program. This unit covers such subjects as safe working habits, personal protective equipment, job site protective measures, scaffolds and ladders, and hand and power tools. By teaching these fundamentals of safety, we hope to make our young craftsmen safe as well as skillful workers.

Of course, many building trades unions have been working at many levels and in many ways to promote the safety of their members. Some of our local unions have had aggressive full-fledged safety programs in effect for years. All of them do a great deal of day-to-day work aimed at improving conditions on innumerable individual jobs. In short, many locals are doing a good job. All could do better; and we hope that they will.

At the international level, we are doing our best to encourage and promote a growing safety consciousness among our members. In our publications, we are placing increased emphasis on safety. As trade unionists and as good citizens, we are trying to do our part in the work of the National Safety Council and other public groups interested in safety.

Last year, for example, the International Union of Operating Engineers devoted an entire issue of their monthly magazine to safety. This union's general secretary-treasurer, Hunter Wharton, has not only been a leader in this international's safety program, but also has devoted many hours to the work of the National Safety Council. He is now serving as vice chairman of the Labor Conference of the National Safety Council.

I hope I have given you some idea of what we in the building trades unions are doing to protect our members from on-the-job accidents. And I think that—at this particular time, in this particular place—I can render no better service to the cause of construction safety than to close by saying to the contractors in this audience that we really are interested in the safety of our members—and more than anxious to work with you in promoting that safety.

DOLLARS AND SENSE OF ACCIDENT PREVENTION

ROBERT W. LONG, *President, Long Construction Co.; Director, Associated General Contractors of America, Inc.*

Historical Interest

Historically, the construction industry has been the forerunner in meeting the problem of occupational safety. The seven wonders of the ancient world were all achievements of our industry, and you can be sure when Khufu built the Great Pyramid with the expenditure of 2 billion man-hours that his safety man had his fill of mashed extremities and strained backs. It is an open, acknowledged secret that the earliest scrolls and tablets were workmen's time books and accident reports—in triplicate. Of interest is the knowledge that his contract was the first to get a 15-year time extension for high water—the Pyramid was actually built in 5 years, but over a 20-year period, when they could only work 3 months a year during the floods as the blocks of stone were lowered downward from the barges.

Throughout the intervening 5,000 years, the relentless urge to glorify man and his gods has consumed great quantities of material and human wealth. The ebb and flow of vandal tides have all but turned to grains of sand these ancient monuments to idolatry. Of fairly recent origin are the constructive efforts to house in an intelligent and productive manner man and his machines—and only in modern times has social consciousness been aroused to the need that workmen be protected in this process of housing and operating these machines.

AGC Program

As the recognized spokesman for the building and construction industry, the Associated General Contractors of America has pioneered organized accident prevention programs. Now in its twenty-second year of effort, the AGC program embraces almost 400 million man-hours annually, and during that period the number of cooperating contractors has grown from 58 in 1941 to 3,300 in 1961. This success did not come easily—over 300 contractors give liberally of their own time to direct this national effort, and there are at least 100 staff men who devote part time to collecting, recording and disseminating the records and information.

This tremendous voluntary program still gives no cause for satisfaction. Although the material prepared under its direction is used generally by all private and public agencies concerned with construction, slightly less than half of our own members actively participate

by reporting yearly results. From the standpoint of man-hours benefiting directly from this effort, however, the percentage would be much higher because all subcontractors working with a cooperating contractor, although not reported in the contractor man-hours, receive the direct benefit of the safety planning.

Personal Experience

As a participant in the AGC accident prevention program and, even more to the point, as a believer in the dollars and sense of such an effort, I would like to refer to our own experience.

It is widely accepted among safety engineers that for industry generally the ratio of hidden costs of accidents is four times the apparent, or medical and compensation, costs. For the construction industry in particular, it is accepted that the ratio instead of 4 to 1 is actually 20 to 1.

One of the hidden costs is the sympathy slowdown. When an accident of any proportion occurs, it affects all the men in the vicinity emotionally to various degrees. Curiosity at first, and for a limited time, overcautiousness to the point of ruining production, at least for that day.

Another loss is that of skilled help. In a remote area where replacement of a man cannot readily be made, time and production of the particular man is entirely lost. Where he can be replaced, there is the further loss of finding the replacement, instructing that man, and watching him to see if you have accomplished the replacement.

Next is loss of materials and equipment involved in an accident. From a humanitarian standpoint, we are often lucky in having an accident without serious injury occurring. However, materials ruined can be a costly item. What is even more expensive many times is the procurement of materials to replace those lost—special orders, LCL freight rates, additional handling.

Another hidden cost is the time lost—a further running behind of schedules, the fact the accident pushes you into bad weather. Of great importance is the disruption of cost control during critical periods.

So much for the generalities, now for the specifics.

Any contractor who pays over \$1,000 per year in workmen's compensation premium is "experience rated," that is, his insurance rates in ensuing years reflect his own experience, good or bad. With total disregard for accident prevention, a contractor can quickly find himself paying oppressive rates, or even without an insurer to take his

risk. Besides the savings in yearly rates, there is also another possible saving by employing a retrospective rating insurance plan, thereby with an improving safety record premium refunds from a cost-plus insurance plan are regularly returnable and are in addition to savings from improvements in his experience rating. By jealously guarding his reputation as a good insurance risk, a contractor can gain both in lowered workmen's compensation and also property damage rates. He can gain or lose to the point that it affects his estimating of job costs in competitive bidding, as in actual performance.

Another advantage is the resulting small turnover in key personnel. He has the opportunity of educating them in safety. They do not go over the hill to overtime-paying expediences, but stay and accept standby assignments until he can place them again in full capacity. Another value is that of gaining the confidence of his employees. They can and will work more efficiently in safe and orderly surroundings. Safe working conditions are always the most efficient. It is our experience that the profitable jobs coincidentally are always the safest.

Insurance Refunds

I would like to tell you how these values have manifested themselves with my own company's experience. We have our workmen's compensation insurance under a retrospective rating plan. After embarking upon a concerted effort toward accident prevention about 9 years ago, the first year we received no refund. The second year we received \$5,000 refund, but by the end of the third year we had received another \$43,000, for a total in our first policy period of \$48,000. Now for the first year of the new 3-year policy period, instead of the zero refund in the beginning, we received \$13,000. This brings our refund total in three consecutive years to \$61,000. This is from refunds alone due to our improving safety. In addition to that, we have been gaining over the same period in our "experience rating." The improvement effected in 1954 was 17 percent; another 8 percent accrued to our benefit in 1955; and then 14 percent more in 1956. This is a cumulative 39 percent reduction in our workmen's compensation rates by the end of a 3-year period as a result of these rate reductions. With \$81,000 in premiums paid in 1954, we saved \$13,700; with \$72,000 in premiums paid in 1955 we saved \$5,800; and paying \$86,000 in 1956 the saving was \$12,000, for a total of \$31,500 less premiums paid than if we had not improved. With a premium of \$100,000 in 1957 and a 39 percent improvement in experience rating, we saved \$39,000 in that year alone against what we might have had to pay had we not improved. That can pay for a lot of safety program.

Paradoxically, at the end of 1957 and 1958 our "experience" rating suffered with an increase in rates of about 12 percent each year. This, however, was not due to a failure of our safety program. Two accidents were very costly, and the premiums paid on our payrolls were largely going into monopolistic States and not to offset the cost of these accidents covered by our private insurance carrier. Likewise, neither was the good experience we were developing in monopolistic States being reflected in our "experience" rating nationally.

We had work in Arizona, Ohio, Oregon, Wyoming, and Saskatchewan, which required workmen's compensation coverage with their State or Provincial governments. Good safety practice, however, is profitable regardless of whether your insurance coverage is with a public or a private carrier. None of the premiums paid to these monopolistic governments were returnable to us in any way as rebates, yet we still benefited greatly from good experience.

In Wyoming a high percentage of our payroll was spent in the very hazardous classification of structural steel erection. Whereas in most States the private carrier's manual rate for this particular work would have been 15-20 percent of payroll, we paid only 5 percent to the State of Wyoming. The good performance of our forces there paid off in this manner: During the first 12 months, and paying only a bargain rate, we developed a credit balance with the State of Wyoming of \$15,000. As a result of this record, the State fund "exempted" us from any further premium payment for the last 4 months of the project. Since we were averaging better than \$2,000 per month in premiums, this amounted to a considerable saving. In addition, we will continue to be "exempt" in Wyoming for a payroll of \$108,000 until such time as we have used up this established credit buffer. In this year of 1962 we are starting a project in Wyoming to which this credit will apply, and we will be the happy beneficiary of the credit so carefully tucked away 3 years ago.

In regard to the improved experience rating as it affects our competitive bidding, about 9 years ago we lost a number of jobs by very close margins. One was a multimillion dollar project, lost by less than \$15,000 in the bid. Our current insurance rate savings alone would have won it.

On one fee project we returned to the owner an unexpected retrospective rebate of \$11,000 2 years after the project was completed.

Methods Used

Of interest to you probably will be the method which we have employed to accomplish these savings, particularly since we generally do not afford full-time safety engineers on our projects. Our safety program was initiated, promoted, and supported by our management.

Without management behind it, a safety program most likely will fail. Our field supervisors play the key role. They are the men on the spot with the know-how. In professional baseball, big league scouts tell us that the most necessary attribute of a big league player is desire. That trait is necessary in field supervisors to make a safety program work. Consequently, we do everything possible to appeal to the normal desires, which are: desire to avoid personal injury—desire for reward—desire for leadership—desire to excel—desire to prevent injury to others—desire to avoid creating an unfavorable impression.

To appeal to these desires, we keep individual safety records on all field supervisors. This is done from a monthly man-hour report and each supervisor is credited with all of the man-hours under his supervision. He likewise is charged for any lost time for any of his injured, as well as the medical and compensation costs for each accident.

The frequency and severity of the injuries are calculated by the formula established by the American Standards Association as the method for recording and measuring work injury experience. "Frequency" is the number of lost-time injuries per million man-hours worked. "Severity" is on the basis of number of days lost time per million man-hours worked.

Awards to Supervisors

Our awards to our supervisors are on the basis of the combined rating, which is the product of frequency multiplied by severity. To have all craft foremen in the same contest and make it fair, another factor can be considered; that is, to adjust the inequity of an ironworker or labor foreman with more risky exposure competing against a cement finisher, you can divide the craft's manual workmen's compensation rates into their rating as a fair adjusting factor. We have not had to compensate in this manner as yet, in that our ironworker and labor foremen have been producing the best results without any compensating factor.

We attempt to get the individual records out to the supervisor monthly until the end of the contest year, at which time a compilation is made and distributed at our annual supervisors' dinner. We run a safety contest yearly to coincide with the national AGC contest, which ends each September 30. Then during October we put on a banquet, at which time cash prizes are distributed to the winners. In that all supervisory personnel are present there is no question or doubt as to who is watching the records and contest. The meeting consists further in the showing of educational material such as films, plus a brief review of the year's experience and news of any new policies or programs, and our outlook for the future.

As to our company's success in AGC contests, we had our best record for the period ending September 30, 1955, and won not even our local chapter contest. The national AGC first place winner was from our own chapter. We did, however, finish within the first ten nationally and we're proud of that, particularly so for the reason that better records were pretty well represented by cost-plus Federal security projects that afforded full-time safety engineers and preemployment examinations. These results tend to prove that the more supervision and screening that can be given employees, the safer the project.

Management Interest

Good safety experience stems directly from management. When interest lags at the management level, it is certain that safe practices will suffer all down the line. The very fact that management gathers statistics makes each subordinate cognizant of a desire to improve.

By virtue of an AGC contractor merely accounting for and reporting his experience, he is provided with a measure to gauge his own performance. When his own performance lags, he will be quicker to instigate corrective measures. By improving, he not only saves money directly on his own insurance costs, but is also serving to better the record of the industry, and therefore, benefit the industrywide rates.

This brings to mind the point that accident prevention is good public relations. An increasing number of owner companies feel the importance of this. Likewise, the absence of good public relations is bad. Owners consider the safety factor more and more. Large corporations often have their safety director on their management committee.

We have had the experience recently on many projects where safety requirements are written into the specifications. Owners who enforce safety aid the general contractor in many ways. A better job is obtained, it is easier to gain the cooperation of subcontractors, and everybody gains. We would have the flat refusal of a few subs to cooperate if the safety requirements were not stipulated in the contract.

We built a plant in Kansas City with 108,350 man-hours without a lost-time accident. We completed a warehouse and office building project in Portland, Oregon, involving 34,000 man-hours with not only a no-lost-time record, but experienced nothing more severe than mere first-aid requirements. It was not necessary to send even one man to the doctor. We built duplicate projects in Memphis and in Denver also with no-lost-time records. To accomplish as best we can the work of a project safety engineer, we make use of the insurance carrier in every way possible. One is by the taking of pictures at the projects by the carrier's safety engineer. These are forwarded to our safety

department, together with a full report of the job inspection. The reports are written candidly, giving credit where credit is due, and criticizing where necessary. These reports are reviewed by management, initialed, and then passed on to the superintendents in the field, with brief "safetygram" handwritten comments.

Since the insurance carrier's safety engineer is qualified to instruct, we have him time his inspections so that a craft, or possibly the entire crew, on a project can be taken for about 15 minutes for a "tool box" talk. In this manner we serve to educate the group in safety gradually.

Choice of Forms

On each accident we require an investigation report to be filled out. There is a choice of two forms for this, one a simplified form put out by the national AGC office, the other is our insurance carrier's investigation report. The latter is considerably more involved, consisting of about 30 questions to be answered "yes" or "no." It is designed for industry generally, rather than just for construction. However, the 30 questions are all teasers, designed to make the superintendent and foreman think. Its use usually will determine for you the cause of an accident. This report is prepared by the superintendent and foreman jointly, and a copy placed on file at the project office. At the time of periodic safety inspection, the carrier's safety engineer then matches up these reports with the formal accident reports which he has in his file. In this manner he has an opportunity to analyze each accident right at the project with the superintendent in charge. It is most important that the supervisors in charge are aware of the cause of each accident. Conclusions are not to be jumped at. Many times an involved analysis is necessary to determine the real cause.

In the way of safety apparel, we provide—and insist upon—hard hats, goggles, and safety belts wherever there is an exposure. Further, we promote the wearing of safety shoes by all employees by making their purchase available at the job site, at wholesale prices. The shoes are such a good bargain that the men can ill afford not to use them.

As for an educational program in safety, in addition to the safety engineer's "tool box" talks, we provide all projects with adequate poster coverage, together with frequent replacements. Also, we issue periodical bulletins to the field supervisors that they may take advantage of our experience on other projects. In addition, we sometimes use envelope stuffers of a comic nature put out by the National Safety Council.

Future Challenge

It has often been said that the construction industry has made no progress—that we build as our fathers and forefathers, or even as the ancients, except without the same care and precision. We still use the identical devices of the wheel, the lever, the pulley, and the inclined plane, and we have gained in productivity only through the changes in our source of power from human, animal, and fire, to air, steam, electricity, internal combustion, and powder actuation. In a very narrow sense this accusation has a thin thread of truth—but in the larger aspect our industry has made tremendous strides in recognizing and providing for the moral values of human worth. Today it would consume the entire dollar output of the United States construction industry to build the Great Pyramid in 1 year, if built in the same manner as it was 5,000 years ago. So certainly we have achieved a dramatic increase in efficiency. Secondly, we have succeeded in reducing the frequency of lost time accidents through close cooperation between employer organizations and labor organizations in programs of safety education, preemployment physical examinations, and apprentice training. Thirdly, we have reduced the severity of accidents through the use of protective devices such as hats, goggles, gloves, shoes, and safety guards. Finally, our industry has led the fight toward rehabilitation of injured workers through liberalizing medical expense and compensation allowances and reemploying the handicapped. But what of the future—how can we prepare ourselves for atomic air compressors, solar shovels, and rocket rivet guns? What happens to the worker who falls off a space scaffold? What precautions are required of an orbiting outhouse?

My thesis is that these problems that face us in this field of human engineering can be solved by serious, devoted efforts such as are identified by this Conference, given on an organized but voluntary basis in a manner similar to the AGC program. I urge all employer-employee groups to recognize the urgency of this need and to prevent Federal or State intervention by undertaking the work voluntarily. On this basis our industry, probably the most hazardous, has made great strides. We are prideful of an improvement over Khufu but humble before the challenge of the space age.

WORKSHOP: SAFEGUARDING THE PUBLIC EMPLOYEE

*Moderator: R. H. FERGUSON, Assistant Director of Industrial Relations,
Republic Steel Corp.*

WORK INJURIES IN THE PUBLIC SERVICE

EWAN CLAGUE, Commissioner of Labor Statistics, U.S. Department of Labor

When I reviewed the discussions of public employee safety in previous sessions of the President's Conference on Occupational Safety, I must confess that I wondered what more could be said on this subject. But then I remembered the primary axiom of the safety movement, that the safety message must be repeated again and again and again. Safety isn't something that can be learned in one lesson or ordered into existence for now and forever by those in authority. We have to remember that the people who make up our work force change—as my good friend Bob Ferguson once said “every day we have thousands of new people who have never seen an elephant.”

Nowhere is this more true than in the public service. Even though we have civil service or merit systems in the Federal Government and in many of the State and local governments, the turnover in the public service is great. This is particularly true among the top officials who have primary responsibility for initiating and stimulating safety activity in their respective jurisdictions. We must, therefore, continually strive to create interest in safety among the newcomers in the public service, and we must periodically revive the interest of those who have continuing tenure in the public service.

To this end, we frequently must revert to fundamentals and reemphasize that which has been said before. Above all, we need to keep looking at the record, first to see how great our current problems are and, second, to see whether or not we have been making progress.

I can assure you that there are many accident-prevention problems in the public service today. And regretfully, I must report that we have been losing ground in some sectors of public employment.

In 1961, our preliminary estimates indicate that public employees in the United States experienced 238,000 disabling work injuries. About 1,600 of these were death cases. In 1950 the corresponding totals were: 149,000 disabling injuries, including nearly 1,100 deaths.



Workshop on Public Employee Safety. Messrs. William G. Marks (Federal); Robert J. Anderson (County); Robert H. Ferguson, (Moderator); Milton M. Bowman (Consultant); Hon. Anthony J. Celebrezze (Municipal); John F. Henning (State). Mr. Ewan Clague and Mr. Arnold S. Zander were not present when picture was taken.

Obviously, the magnitude of the accident-prevention problem in public service has been increasing rapidly and today stands at a shockingly high level.

We can, of course, offer as an excuse for this sharp upswing in injuries the fact that the number of persons in the public service has also been rising consistently throughout this period. And we can contend that perhaps the picture isn't really so bad as these figures seem to indicate.

This concept has some validity in respect to the Federal Service. Here employment has risen 19 percent since 1950 while the annual volume of disabling injuries has risen only 10 percent. Superficially, this indicates some improvement, but we can hardly point with pride

to a record of 40,000 disabling injuries in 1961 and a compensation and medical cost of \$36 million in 1960.

The picture for State and local government service is strikingly different. Here employment in 1961 was about 60 percent higher than in 1950, but the volume of disabling injuries was 76 percent higher. Here the record is definitely running against us. This upward trend culminating in 197,000 disabling work injuries in 1961 offers no reason for pointing with pride. Only in a few local jurisdictions where effective safety programs have been established do we have evidence of improvement. Fortunately, the number of such programs is growing.

These broad injury volume figures amply demonstrate that we do have an overall accident-prevention problem of considerable magnitude in government service. Our next step should be to identify the particular activities in government which have the least favorable injury experience so we can concentrate our accident-prevention efforts in those areas.

In the Federal Government, we have reasonably comprehensive information for this purpose. We have an overall injury-frequency rate for all Federal employment which is computed annually and, incidentally, is currently about 20 to 25 percent below the comparable all-manufacturing rate. We also have similar rates for each of the Federal departments and agencies, and for the major bureaus or subdivisions within the separate departments and agencies. These rates are compiled uniformly by the Bureau of Employees' Compensation and effectively pinpoint our problem areas. Mr. Marks will be discussing these data and their significance in detail, so I shall offer only one general comment about them. The latest report of the Bureau of Employees' Compensation, for the year 1960, lists the frequency rates for 30 major departments and agencies. These rates range from a perfect record of no disabling injuries in the Securities and Exchange Commission to a high of 20.1 disabling injuries per million employee hours worked in the Post Office Department. Within these major agencies, there are many Bureaus or subunits which have much higher injury rates. In large measure, this wide range of injury experience reflects the rather extreme variation in the kinds of activities carried on in the Federal Government. Certainly our service is not limited to relatively safe clerical-type activities as many persons seem to think. Unfortunately, however, this is not the entire

answer. We do have wide differences in the degree of interest in safety prevailing at the policy-making levels in our departments and agencies. We need to overcome this lack of interest if we are to make real progress in improving our injury records.

In the area of State and local government, we have far less information on which to base an appraisal of the problems which must be solved. Only a few of the many State and local government units maintain comprehensive records of their employees' injury experience. As a result, we have only crude estimates of the overall national record. We cannot at this time present a meaningful national frequency rate for State, county, or municipal employees. We are, however, making some progress in the collection of injury-rate information for particular kinds of activities in this field. Currently we have comparison figures for ten activity classifications, and we hope to expand this list as rapidly as the local government agencies can be persuaded to keep the necessary records. The activities for which basic injury rates are presently available are: Local transit systems; electric and gas utilities; water supply utilities; sanitation departments; sewer departments; elementary and secondary schools; colleges; hospitals; fire departments; and police departments.

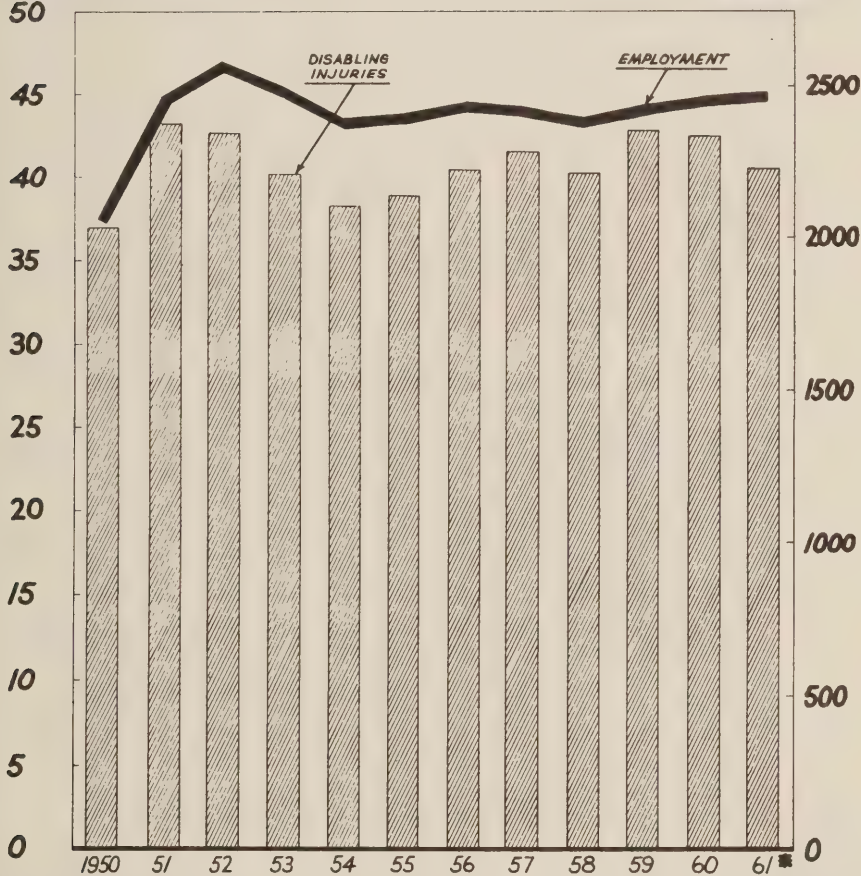
This list, I am sure, includes many of the more hazardous activities of State and local governments and excludes most of the low-hazard activities. It does not, therefore, present a fair overall picture of the actual level of injury experience in the State and local government service.

We cannot help but be impressed, however, by the fact that the injury-frequency rate for sanitation departments consistently stays above 50; that police, fire, and sewer departments commonly have rates in the high 20's or low 30's; and that our public school and college employees regularly have injury rates only a little below the national average for all manufacturing. Granted we need much more information than we have, but I think that what we have is enough to demonstrate that there is a serious and largely unmet need for accident prevention programs of considerable magnitude in the State and local government service.

DISABLING WORK INJURIES IN FEDERAL GOVERNMENT ESTABLISHMENTS RELATED TO EMPLOYMENT 1950 TO 1961

THOUSANDS
OF INJURIES
50

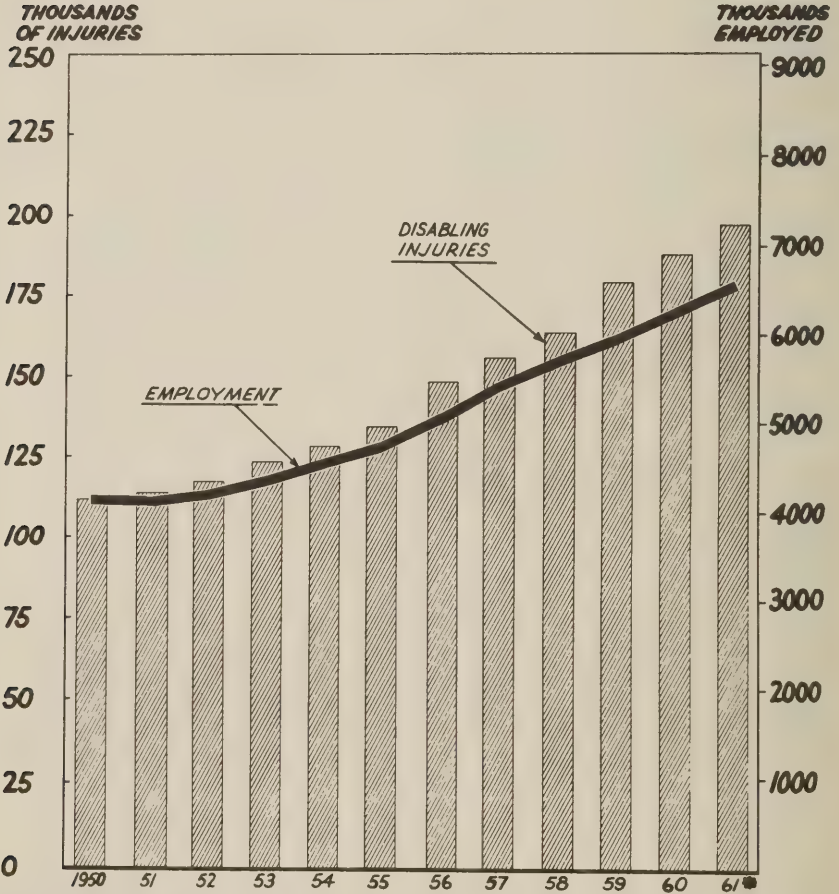
THOUSANDS
EMPLOYED



SOURCE:
U.S. DEPARTMENT OF LABOR
BUREAU OF EMPLOYEES' COMPENSATION

* PRELIMINARY

DISABLING WORK INJURIES IN STATE AND LOCAL GOVERNMENT ESTABLISHMENTS RELATED TO EMPLOYMENT 1950 TO 1961



SOURCE :
U. S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
DIV. OF INDUSTRIAL HAZARDS
FEB. 20, 1962

* PRELIMINARY

MUNICIPAL EMPLOYEE ACCIDENT CONTROL

THE HONORABLE ANTHONY J. CELEBREZZE, *Mayor, City of Cleveland, Ohio*

I have looked forward with interest to attending this President's Conference on Occupational Safety and to my participation in this workshop session which is directing attention to the importance of public employee safety. For the past 10 years, it has been most gratifying to observe at close range the sincere, determined, and diligent efforts which you have put forth in the interest of accident prevention.

One of the most encouraging developments in municipal administration in the past decade has been a steadily growing awareness of the importance of accident prevention and the development of an increasing number of programs which are effectively reducing accidents and injuries and saving lives.

I have followed with great interest the very effective work done by those of you who have been associated with the public employee section of the National Safety Council and other committees and conferences, which have been functioning so effectively throughout the United States and Canada in stimulating this awareness and providing guidance in program development. We are indebted as well to the various agencies of the Federal Government, and especially the United States Department of Labor for the leadership it has given.

This Conference serves as a very timely check point for assessing where we stand on municipal employee safety. It has been 10 years since the President's Conference on Industrial Safety in 1952, at which we accepted the challenge to "Stimulate Public Employee Safety."

Much has been accomplished.

Much remains to be done in 1962, as we respond to President Kennedy's call to this Conference on the theme of "Safeguarding Human Worth."

May our response make this Conference truly a rallying point for redoubled-accident control and safety effort in the cities throughout the Nation.

Facts are the foundation of any effective accident control effort. Commissioner Clague has placed the record before us. The record is encouraging. It shows that we have made progress. The record is challenging. It shows that there is still a big job ahead.

Ten years ago, there was little interest at the municipal level in employee safety. There were at that time, however, a few notable exceptions.

A number of cities were pioneering in developing comprehensive employee accident programs, but even they had frequency and severity rates that were three times higher than the average industrial rates reported to the National Safety Council at that time.

A nationwide study of employee safety programs made in 1951 covering over 400 municipalities revealed 62 percent had no formal safety programs whatsoever and less than 10 percent laid claim to safety engineering training or other elements basic to any organized safety program.

I believe that a similar survey made today would reflect a vastly changed picture. I would urge this President's Safety Conference to endorse such a survey, not merely as a measure of progress in the past decade, but as a point of reference for future activity and emphasis in the field of Municipal Employee Safety.

There have been some significant indications of a favorable trend. The Texas Municipal League, in a recent report, cited the great interest developing through the State in city accident control programs. The growth of the public employee section of the National Safety Council is evidence of mounting interest and concern, as is the increase in the volume of inquiries received regarding procedures to follow in municipal safety programs.

More cities are asking the question, "What is needed to reduce accidents?" More municipal officials are recognizing that government should not be lagging behind industry, but should be setting the example. A concern for human values comes first. Safety means needless suffering avoided and lives saved. Safety also means that tax dollars otherwise drained away by accident losses can be used for improved and expanded municipal services.

What has our cumulative experience, to which you as participants in this Conference have contributed so much, shown to be the requirements for an effective program of reducing accidents?

Fact finding comes first. Establishment of a central accident control division, which collects, standardizes and analyzes and interprets all reports and data on employee injury and accidents is a prerequisite to an effective safety program.

A second step is designation of a safety coordinator with responsibility for applying all available safety engineering, employee training and communication resources, and assisting line management in giving leadership in this important phase of its total responsibility.

A third basic requirement is a medical facility for screening of new employees and reexamination of present employees whose jobs involve physical requirements and demands significant for their own safety and the safety of others.

Another ingredient of a successful program is a motor vehicle accident control program. Bearing in mind that the city is one of the major motor vehicle fleet operators in any community.

It is the ultimate in irony for a city government to concentrate on traffic safety through police enforcement, traffic engineering and safety education, and at the same time neglect its own responsibility for promoting safety in operation of its own vehicles.

Along with establishing the necessary organization and procedures for accident reporting and corrective action, there must come a realization that accident control can only be accomplished through the understanding, effort, and cooperation of the people in your organization.

People must be helped to recognize the hazards around them.

People must be shown how to control these hazards as completely as they can.

People must be encouraged and helped to do things the safe way.

This requires more than merely telling people what we want them to do. There must be participation from top to bottom of the organization.

There must be total involvement.

Everyone has a stake in safety. Everyone should be permitted to share the responsibility and the satisfaction of safety accomplishment. Employees themselves should have a part in investigating accidents, taking corrective action and planning safety improvements. This applies the total knowledge, experience, and ideas of the work force to accident control. This provides real motivation and incentive.

This is the basis for our approach to accident control in Cleveland, which I have been asked to describe.

We began by making it clear that accident control and employee safety was a major goal of the city administration and a major responsibility from the top down. A statement of policy was issued, which stressed the importance of accident prevention to the well-being of city employees and to the efficiency of the city service.

Instruction of all employees in accident prevention was ordered.

Top management, especially, was asked to keep abreast of safety activities throughout their area of responsibility.

All employees were called upon to give their full support to the safety program.

What steps have we taken to make this policy effective?

Consistent with what I said earlier as to the need for a central staff unit to standardize, collect and interpret accident data, a division of employee accident control was established by ordinance in the De-

partment of Finance and a safety coordinator was appointed to administer a comprehensive personal injury and motor vehicle accident control program. I might add that this unit also was given responsibility for the administration of claims for compensation, including review of premium rates in collaboration with expert actuarial assistance and liaison with both city and private medical clinics, physicians, and hospitals.

New employees are given the basic safety story in their orientation training. Supervisors receive periodic training in safety objectives and methods, both in management development workshops and in a safety training course, sponsored by the Division of Safety and Hygiene of the Industrial Commission of Ohio.

This course consists of 10 weekly 2-hour sessions conducted by instructors selected from our own organization and by staff members of the Division of Safety and Hygiene of the Industrial Commission of Ohio. This training is an important part of our accident control program.

A strong accident control staff service, which we have, is however, not enough.

I have said earlier that "telling" people is not enough. A staff unit, safety educators and even safety engineers cannot do the whole job.

Accident control must be primarily the concern and responsibility of line management. For that reason, although we have established the necessary central accident control division, provided training and safety engineering services, we place primary responsibility for employee safety upon our nine department directors, who form the Mayor's cabinet. We recognize *safety as an operating responsibility*.

The director of each department has been instructed to meet with his commissioners or division heads at least once every 3 months to review all phases of the accident experience of the department and to formulate plans, recommendations, suggestions and policy for improvement.

Each commissioner or division head has been instructed to hold similar meetings with his principal unit heads every 2 months.

Each superintendent or other unit head holds monthly meetings with his safety committee members, including driver trainers, to review all accidents, discuss the manner in which they can be prevented, accept and review safety suggestions, review housekeeping procedures and the condition of equipment, and develop educational material and safety procedures. Meeting proceedings are reported to the division head.

This procedure, as you can see, involves everyone and helps keep everyone safety conscious. A very desirable tie-in with community-

wide traffic safety and overall safety activity is provided by the fact that our safety coordinator also works with the Mayor's Traffic Safety Education Committee and the Councilmen's Ward Traffic Safety Committee and various other governmental and civic groups active in the safety field.

We feel that our total program, consisting of an emphasis on basic operating management safety responsibility and the provision of effective accident control staff services, has paid wonderful dividends.

Lives saved and injuries avoided are, of course, the first benefit. Beyond that, we have considered our employee safety program a major factor in sound fiscal administration. Accidents and injuries can be costly and drain away much needed municipal funds.

This Conference brings together key leadership from many fields of municipal endeavor. It brings into clear perspective a shared responsibility for promoting safety and accident control. Represented here are many key organizations such as the United States Conference of Mayors, American Municipal Association, International City Managers Association, Municipal Finance Officers Association, the National Institute of Governmental Purchasing, the American Public Works Association, Public Personnel Association, American Transit Association, and other national and local organizations, concerned with municipal management in one form or another.

I would hope that the emphasis of this Conference be transmitted through the individuals participating in these organizations, and be reflected appropriately in their meetings, publication, and program activities.

I would also hope that this Conference will put the spotlight on the importance of the excellent accident prevention work being carried on by other associations having a major role in various municipal services, such as the American Water Works Association, Water Pollution Control Federation, American Public Power Association, National Arborist Association, AFL-CIO, Fire Fighters, police groups, our recreation people and others.

It would also be very helpful if the Bureau of Labor Statistics of the U.S. Department of Labor, could explore the possibility of expanding the program of collecting standardized accident experience data to include all divisions of all municipalities, so that we may have a broader comparative accident statistical picture as it pertains to cities.

An annual safety inventory, such as the National Safety Council conducts in traffic safety as a basis for granting safety achievement awards as an incentive in this important area of endeavor, would also be most welcome.

Another worthwhile activity would be the conducting of regional safety training classes in the essentials of municipal employee accident control.

These training classes should be made available at a sufficient number of locations so distributed as to be readily accessible to any interested city, at a minimum of travel cost for instructors and participants.

A cooperative effort of this kind would make help available for all municipalities interested in organizing an employee safety program, gathering accident data, stimulating employee interest and taking corrective action. Through this means, help would also be available in actuarial and other workmen's compensation matters and in such specialized areas as motor vehicle accident control.

Sound management has assumed a new importance in municipal administration in the sixties. For most cities, responsibility for providing expanded services and undertaking new programs has increased more rapidly than tax resources available to do the job. This places a high premium on doing the most effective management job possible in order to get the most out of the limited resources available.

Under these conditions, the management responsibility of both elective and appointive city officials takes on new and broader dimensions. Safety cannot be a side issue. It must be recognized as a basic part of the management job from top to bottom.

This 1962 President's Conference on Occupational Safety offers a most timely forum for placing Municipal Employee Accident Control in proper perspective as a major responsibility of the Nation's municipal government leadership.

Employee safety, both as a humanitarian goal and as an important obligation to the public we serve, in the form of greater efficiency and better service at lower cost, needs and is worthy of massive cooperation.

To this end, I now use this national forum, made possible by the President of the United States, to call upon and to urge my colleagues, the Mayors of all municipalities in this land, individually and collectively, to inaugurate safety programs for municipal workers where none now exist, to improve them where they do exist; and, finally, by our joint endeavor to make sure that when this Conference next assembles the area of safety for employees of local governments will be singled out for its demonstrated accomplishments rather than for its demonstrated need.

COUNTY EMPLOYEE SAFETY

ROBERT J. ANDERSON, *County Administrator, Summit County, Ohio*

How can counties safeguard their employees and the public they serve?

An automobile represents one of the greatest safety hazards that confront county government. Therefore, visualize with me, a 1962 sheriff policing cruiser; one that is fabricated by the best of America's engineers serving a \$281½ billion automobile industry:

Dual-carburetors ensure engine operation in tight emergencies.

An *alternator* gives the electrical system that *extra* spark of engine operation and that *extra* energy for flasher lighting, sirens, two-way radios, etc.

County officials and sheriffs order special oversize brakes and shock absorbers, so deputies can *slow up, accelerate* or *stop* without losing control of their vehicles.

Snow and mud tires are ordered because *good traction* is the vehicle's only contact with the ground.

First aid kits, oxygen and fire extinguishers are added primarily for the safety of others. Battery cables are used by deputies to quickly clear the highways of stalled vehicles, a commonplace road hazard.

Proper insignia and safety belts now complete our requisition.

We now have, for both the operator and the public, the safest vehicle that county officials can buy for the policing of their county.

I. Enforce Safety Device Usage

When the driver of this ultra-safe vehicle is behind the wheel, he is forced in the mere operation of the vehicle to use many of these modern safety devices. I refer to the dual carburetor, alternator, heavy duty brakes, heavy duty shock absorbers, and snow and mud tires. These devices are components of the vehicle.

However, there are other devices that are used upon the option of the driver; such as the flasher lights, siren, and seat belts. I can't picture a deputy not using his flasher lights or the siren when the emergency arises.

But what about the safety belt? It isn't a safety belt unless it is fastened!

We hear so much these days about near fatal and fatal accidents that could have been prevented by the use of safety belts. I have a fear that future accident surveys will show unused belting and fasteners as a major contributing factor in serious accidents.

Therefore, when county officials do provide safety devices, they must enforce the use of such devices.

Properly trained employees who fail to use their safety devices should be suspended or dismissed from their county jobs.

II. Safety Includes Personal Health

We have outlined the precautions necessary to obtain the safest vehicle. We have instructed drivers how to use these safety devices. Yet, after this is done, over 90 percent of the 3,048 county governments in the United States, permit the driver of this near perfect vehicle to operate it without a medical examination.

This is like insisting that "the operating room and its equipment are more important than the surgeon." A near perfect vehicle driven at high speeds in the hands of an operator who could be subject to a heart attack, or incapacitated by high or low blood pressure, epilepsy, and diabetes, just doesn't make good sense.

I am recommending a medical examination only for hazardous jobs such as high-speed driving, working on ladders, scaffolds and roofs, and other jobs requiring emergency actions.

Personal health is a basic component of safety. Medical, yes and even psychiatric examinations should be required for all hazardous jobs.

Human Relations

Even with the proper devices and a healthy operator, we may still have the problem of getting the operator to do his work safely.

It is ironical that when buying equipment, we are precise in our specifications, alert in oiling and servicing the equipment, and quick to spot any sluggish mechanical operations.

But our most valuable asset in the performance of county government is people. People are the hub of all our activities.

Machinery, equipment, furniture, fixtures and all stuff we buy outside of personal services, are merely the spokes in the county wheel of operation.

Without people we have no hub to this wheel. We get results through people.

Isn't it time that we become more concerned with the smooth working of our employees, even at the expense of being less concerned about equipment? This need demands communication.

Training Is Our Most Effective Communication

To accomplish this we must become more involved in a study of human relations. And this requires special training in good and

effective communications. There is general agreement that failure of good communication is the greatest obstacle in our path of "Safeguarding Human Worth." Communication, as you well realize, is the act of interchanging facts, thoughts, and opinions. *Good* communication is a two-way process—it is both sending and receiving messages.

Newspapers, magazines, television, radio and all other communication media send out messages. Unless surveys are made, these media have no idea—

"if" they are heard,

"why" they are heard,

"where" they are heard,

"how" they are heard.

They can't measure the quantity and quality of their impact.

If we want to do the best job of safeguarding human worth, we should use the person-to-person system of communication—training.

Training is personal—good training guarantees employee response—it ensures the trainer that the message is getting through.

Training is communication, plus its responding echo.

Let us explore some types of training that will "Safeguard Human Worth."

III. Job Relations Training

Our first training objective is that of working with people.

Job relations training provides both the knowledge and the skill by which we get results through people. Basic foundations for good relations are deeply embedded in the facts and truths of experience. This is knowledge.

The application of knowledge for a desirable result is skill. Therefore, in understanding an individual or handling a problem, the first step in job relations is to get all the facts. No man's knowledge is better than his information.

Here are the steps to get that information:

Review the record

Find out what rules and customs apply

Talk with individuals concerned

Get opinions and feelings.

Be sure you have the whole story! Don't jump to conclusions!

After we have the facts we must then weigh and decide—

Fit the facts together

Consider their bearing on each other

Determine the actions that are possible

Check practices and policies.

At all times we must consider the objectives and the effects on the individual, group, and production.

This human relations phase of training is our greatest pitfall in the motivation of people. But it is most important if we want to prevent accidents.

This training:

1. Helps us find the right man for the right job. Conversely, the right man on the wrong job causes accidents.
2. Teaches us to spot a worker who is not up to par before he has an accident. A good safe worker is a poor, unsafe worker if a personal problem is plaguing him. An employee awaiting a hospital report on the condition of a tumor of some member of his family does not make a safe worker.

Our first line of management must develop the art of human relations in order to safeguard human worth.

IV. Job Methods Training

Our second training objective is job methods training. Job methods training teaches supervisors and employees to break down jobs into small steps or details of work. A detail is every single thing that is done, every inspection, every delay.

After you have a job breakdown, this training process teaches you to question each detail. The questions "Why is it necessary?" and "Does it have a useful purpose?" eliminate many unnecessary details that didn't need to be done in the first place.

The time saved by eliminating unnecessary details can be utilized in doing the necessary details. Details performed without haste are details performed more safely.

Necessary details are subjected to four more questions:

1. "Where should it be done?"—may tell you of a better and safer place to do it.
2. "When should it be done?"—will show you a better and safer time in which to do it.
3. "Who is best qualified to do it?"—points out a better and safer person to do that detail of work.
4. "How is the best way to do it?"—develops new and safer methods. The answer to this question provides us with the jigs and fixtures we use, instead of hands for holding work.

While we are developing and improving new methods we always make sure that the new method and procedure is safer for the worker.

Unless job methods training is used, man resorts to unconscious means of finding a safer way; or—he corrects the condition after the accident.

V. Job Instruction Training

After we have developed the best method of work, how do we get present and new employees to learn this new procedure?

Job instruction training, our third training objective, is a positive method of instructing a new employee or an old employee in a new and safer procedure. It's so positive that the instructor starts with this premise: If the worker hasn't learned, the instructor hasn't taught. How many instructors blame themselves for not teaching? This method, when used, can't fail to get a responsive learner.

Briefly, this plan, like job methods training, begins with the breakdown of the job to be taught. Key points and safety precautions are emphasized.

The instructor tells and retells the worker how to do the job and has the worker tell and retell it back to the instructor.

The instructor shows and reshow the worker how to do the job and has the worker show and reshow the instructor.

The instructor tells and demonstrates the work, and has the worker tell and demonstrate what he has learned.

This process is repeated with the key steps and safety precautions until the instructor is positive that the worker now understands the work to be performed.

Constant follow-up is needed to make sure that the worker does not slip back to old or unsafe practices.

A good instructor always welcomes suggestions from a conscientious worker. Good training is safer training. Before you blame the worker for unsafe practices, remember—if the worker hasn't learned, the instructor hasn't taught.

VI. Clearinghouses for Accident Reports

In order to handle a problem, it is first necessary to get all the facts. Accident prevention is a problem; therefore, in order to solve this problem, we must start at once to compile facts on accidents in county government.

How can we prevent the same accident from recurring? Shouldn't we catalog the accident and its underlying cause?

An accident in California, properly cataloged and analyzed, may prevent the same accident from occurring in New York 6 months later.

Generalized statistics only tell us that our accident situation is bad. Specific statistics tell us that the condition is bad, plus a means of correcting the underlying causes.

Let's have "lost-time" accidents recorded for a good future; not merely to show a horrible past.

Counties, therefore, should report "lost-time" accidents with their corresponding causes to their State organizations, which will forward their consolidated finding to a national clearinghouse. And, of course, this means we should establish clearinghouses on the county, State, and national levels.

VII. A County Safety Committee

How can we set up this clearinghouse on a county level? There are three logical steps to be taken:

1. Establish a County Safety Committee. Be sure some of its members are made up of representatives from those departments where accidents are the greatest. Have them meet every three months or more often if the need occurs.
2. Investigate and Review All Accidents Involving County Employees. Compile statistics of workmen's compensation and liability insurance rates for the past 5 to 10 years. Find out why your rates have increased. Make good use of your underwriter's knowledge of your safety problem.
3. Develop a Safety and Accident Prevention Program. You can't afford it? You can't afford to be without it! Reduced rates in premiums and reducing "lost-time" accidents will pay you dividends. New employees are not necessary. This is a committee of present employees, dedicated to safety, looking at where you have been, where you are going, and mapping a safer journey.

VIII. Sell the Safety Program

The best safety program isn't worth a plugged nickel unless it can be sold to all concerned. At this point, we must bear in mind that good ideas meet resistance. We highly recommend the following positive steps to offset this resistance:

1. Have good preparation—lay good groundwork and have good relations with all concerned.
2. Get broad participation—eliminate jealousy—let others be a part of the proposal.
3. Keep an open mind—better ideas may be forthcoming—a compromised, accepted idea is better than a perfect unacceptable one—perfection will follow.
4. Watch your timing—wait for a better time—but don't use timing as an excuse for never doing it.

5. Use organization channels—this will eliminate untrue objections. Remaining objections will be sound objections.
6. Make a good presentation—use oral and written words and pictures; demonstrate. Show savings in lives, injuries, time and money.
7. Follow through—don't let an accepted good idea die of misuse. Some cautions are:
 - a. Don't attack resistance by public criticism.
 - b. Don't heap proposals upon proposals far beyond the ability to initiate.
 - c. Don't be the star; be the humble coach of an all-star team.

Sell the safety program so that it is accepted and put to use—willingly and well.

Time doesn't permit me to do more than merely mention other safety factors such as building conditions, tools and equipment, ventilation, sanitation, lighting, layout and housekeeping.

Summary

How can counties safeguard human worth for both their employees and the public?

- I. Provide safety devices and enforce their usage.
- II. Insist on personal health examinations for employees on hazardous jobs.
- III. Provide job relations training.
- IV. Provide job methods training.
- V. Provide job instruction training.
- VI. Set up accident clearinghouses.
- VII. Establish county safety committees.
- VIII. Sell the safety program.

When man disables or kills, he robs another human being of his opportunity to develop his God-given talents for the best interests of the community.

Whether by intention or accident, no person should dare to work at cross purposes with man's reason for being.

And certainly county governments should not dare assume the responsibility of crippling the talents and shortening the life span of any of their employees.

STATE EMPLOYEE SAFETY

JOHN F. HENNING, *Director, California Department of Industrial Relations, and Administrator, California Employment Relations Agency*

I am very pleased to participate with you in this important workshop of the President's Conference on Occupational Safety.

I am pleased because I believe strongly there is an important job to be done in the field of public employee safety and particularly at the level of State government.

Let us face the fact that the story of public safety in this country is one of too little and too late. As previous panel speakers have already pointed out, government has lagged behind private industry in establishing safety programs and in reducing on-the-job injuries.

Let us also face the fact that State government has lagged behind local government in this serious business of saving life and limb. The truth is that very few States have any kind of an overall safety program approaching those of private industry or of many counties and municipalities.

We have made a small start in California and I would like to tell you something about our program. In all frankness, I want to say that I am not at all satisfied that we have done enough. It is my hope that we can go far beyond our present efforts.

In our State, the public employee safety movement got its impetus from the California Governor's Industrial Safety Conferences we have held each year since 1950.

As a matter of fact, public employee safety was not even discussed at the first conference. Requests, principally from local government representatives, led to the creation of a separate "governmental agencies" section for the 1951 conference.

This has become the fastest growing section of the Governor's Industrial Safety Conference. Attendance in this section at the last two conferences, 1961 and 1962, was the largest of any of the eight sections into which the conference is divided.

Helpful in developing an interest in public employee safety were the extensive statistical tabulations prepared by our Division of Labor Statistics and Research on work injuries at every level of government. (Our law requires all work injuries to State and local government employees be reported in the same manner as injuries to employees of private firms. There are no exceptions.) These statistics pointed up the fact that a serious problem existed and that effective solutions needed to be found.

For California State government, the Division of Labor Statistics and Research prepared very detailed analyses of all disabling injuries

to State employees, classified by department, occupation, accident type, agency, and nature of injury.

These statistics showed the departments with the most serious problems and demonstrated that all departments could profit by vigorous safety efforts.

In 1952, the position of State Safety Coordinator was established on the staff of the State Personnel Board. His responsibilities were to promote safety activities in the individual departments and to coordinate these activities.

Until recently his was a one-man operation. He now has an assistant. When you consider that we have over 100,000 State employees, you can see what a herculean task is faced by this two-man office.

Let me tell you of the successful driver safety training program this office organized and completed recently. The State of California owns a fleet of 20,000 vehicles operating 228 million miles a year and you can easily see that we have an enormous risk exposure.

On orders from Governor Brown, all employees who drive State cars took an intensive driver training course conducted by State training personnel. These instructors were trained under the direction of the State Safety Coordinator and the Chief of the Division of Industrial Safety in my department.

Already the highway accident record has improved so much that the State has received a refund of \$123,000 from the insurance company carrying our public liability and property damage risk.

Outside of driver safety, here are some of the things we've done.

Several departments have assigned full-time personnel to employee safety activities. Among these are the departments of Mental Hygiene, Water Resources, and Public Works. Most of these safety officers took training with our Division of Industrial Safety before they launched their departmental safety programs.

A series of safety workshops was conducted for nursing service personnel and for kitchen and diningroom help employed in our State institutions.

One activity that has been quite successful has been the holding of regional safety meetings throughout the State for specialized classes of State and local government employees. One group is comprised solely of firefighting personnel. Another consists of law enforcement officials (police, sheriffs, game wardens, etc.). A third category takes in employees engaged in public building maintenance and operations. Still another is made up of street and road construction and maintenance employees.

The meetings of these groups are devoted to the specialized safety problems related to their work. There is an excellent interchange

of problems and solutions and all who have attended agree these meetings have been very productive.

We plan soon to set up a new group—to consist of employees in public hospital administration—State and local.

I wish I could report a spectacular decrease in the State employee injury rate as a result of our efforts. But, the truth of the matter is that I can't. We are not able to match the 25 percent injury rate reduction recorded by private industry in California in the past decade.

However, in the light of the rapid growth of State government employment in California, perhaps our record is not too bad. For we know that when employment climbs fast, the injury rate goes up.

Nevertheless, I am not at all proud of our results and I know we can, and we will, do better.

State government has far to go in safety before we can take much pride in accomplishment. What do we need?

1. We need detailed facts on injuries to State employees. Fortunately, in California we have a wealth of data that have proven very helpful. Very few of the States have the necessary information on which to build a sound safety program.

We need facts on costs of work injuries. I suspect that only a few of the States know how much job injuries are costing them. In California, the State is appropriating nearly \$3 million for workmen's compensation costs for the next fiscal year.

We should examine reporting procedures and safety regulations governing State employee injuries. All State agencies should be subject to the same reporting requirements and the same safety regulations and inspection as private industry. Fortunately, this is the case in California.

Private industry knows that "safety pays" and knows how much. Government needs the same kind of information.

The facts will demonstrate the need for action and also will point up where the action should be applied.

2. Having the facts is not enough. We need to motivate those in responsible management positions in State government to take action. We know from experience that unless management demonstrates a genuine interest in safety and backs the program very little progress can be made.

3. The States should support employee safety activities with money and personnel. We must budget for safety. We must provide full-time safety officers where we need them and assign part-time safety responsibilities to a staff member in the smaller departments.

4. To insure *wide* success of the program, rather than spotty performance, the Governor in each State should assign responsibility for

State employee safety to one top official and hold him accountable for results. This official would be the counterpart of the chief safety engineer of a large firm.

If our experience in California may be taken as a guide, progress may be slow at first. But if we are willing to develop the necessary programs, spend the necessary funds, and expend the necessary energy, we will make a breakthrough and achieve a significant reduction in work injuries among State employees.

THE FEDERAL GOVERNMENT LOOKS AT ITS OWN SAFETY PROBLEMS

WILLIAM G. MARKS, *Deputy Director, Office of Administrative Operations,
U.S. Department of Commerce*

I like to think that most of us are human—even though safety officers. At least, we all have some of the basic human weaknesses. And one of these is a tendency to feel that *my* hopes, *my* goals, and *my* problems are somehow unique. The other fellow's aspirations are never as grand—and his problems never as complex—as our own. This is a natural human foible. But we all know, when we stop to think about life, that men are more alike than unlike and that their hopes and problems are almost universal to the race of man.

So, in our accident prevention work, we sometimes fall into the habit of thinking that our particular problems, our particular circumstances, are unique—in their size, their complexity, or some other vital element. Naturally, this thought makes a convenient peg on which to hang a lame excuse or two. However, I believe we can all agree that most safety problems confronting industry, business, and Government are more similar than dissimilar—and the same prescription, with a little variation in the dosage, can be applied to these universal ailments.

I hope, therefore, that my topic, "The Federal Government Looks at Its Own Safety Problems," will not be construed to suggest that the Government's safety problems differ in their essential nature from those of any business enterprise. Like hominy and grits, the shape may be different, but the taste is the same. And those of you who are not a part of the Federal Government will find, I think, that the suggested treatments have a familiar ring.

At the outset, let me also say a word about what I believe is a common misconception of the progress of the Federal Government in the safety field. We have told ourselves so many times in the past ten years that the "Government must lead, not lag" in accident prevention; we have cited so many unflattering statistics; we have spouted so many generalities, that I think we have finally convinced ourselves, as well as

everyone else, that the whole of Government is at a standstill, so far as safeguarding its employees is concerned. Nothing could be less true.

Let us give credit where credit is due. The Bureau of Employees' Compensation statistics show that, with the exception of one or two agencies, the Federal Government's injury rate has declined steadily year by year since 1947. In 1960, the Federal injury rate, figured on this basis, was slightly more than 5 injuries per million man-hours. This by any standard, represents very good performance for the wide range of hazardous exposures encountered in Federal programs. It might even be said that a rate of about 5 is getting fairly close to the point where further progress will be most difficult.

Of course, further progress can and must be made. But with most Federal agencies showing consistent improvement for 15 years, it seems to me it is time we got rid of our guilt complexes and took some pride in our own very substantial accomplishments. I am glad to say, by the way, that the one or two agencies which have been having difficulty seem now well on the way to real improvement in their records.

In addition, I think I should point out that many Government agencies have taken the lead in developing safety and industrial health programs related to the many new technologies which characterize the modern day. In fact, it appears that some of our great new problems are finding solutions quicker than the old familiar safety problems that have been with us since the time of Adam.

With this background, I would now like to suggest for your consideration a few ideas which I think could give new vitality to our Government programs:

First, and to me most important, is the need for making a concerted effort to keep top management constantly informed and enthusiastic about the requirements of accident prevention. Safety is like "flag" and "mother"—everybody is in favor of it. But we who have had to beat the drum for safety know that it takes a lot of drum-beating to keep safety up front in operational planning.

It seems to me that the Federal Safety Council can do much to assure that top Government officials fully understand the requirements of an effective accident prevention program. The President has given us the benefit of his leadership and interest. I hope that we, in the Federal Safety Council, will regard that leadership as a challenge to find new and better ways to bring our message to top officials throughout the Federal service.

My second proposal is very closely related to the problem of keeping management informed. I believe there is an important need to have for the first time a top-level audit of every agency's safety program to examine the soundness of our approach and clearly identify problems of principal concern.

I am *not* suggesting a rash of job-level inspections or investigations. These are important to the every-day operation of a program but do not serve the broader purpose I have in mind. Any audit designed for later consideration by top officials must be a sophisticated appraisal of broad policy and program elements, performed by a competent specialist.

I *am* proposing top-level interagency communications face to face which will place safety in its proper perspective from the point of view of agency heads. I suggest the Federal Safety Council review this matter and make appropriate recommendations at an early date.

In this regard, I offer the further thought, which I have expressed many times, that the Federal Government has a corps of top-flight agency safety personnel who, as members of the Federal Safety Council, could be used to great advantage in consulting with other agencies on general problems. It is most unfortunate that all this talent remains untapped.

Finally, there is a very real need for *coordinated* action in the area of highway safety, which, in the Federal Government alone, affects the operation of more than 200,000 Federal vehicles, and perhaps that many more private cars used for official business. In the course of research on this subject, I was amazed to learn how few data are actually available to measure the scope and severity of this problem. But I learned enough to be convinced that here is a serious gap in our Government-wide assault on safety problems.

The Bureau of Employees' Compensation in 1960 reported that about 5 percent of all disabling injuries to Government employees were attributable to motor vehicle accidents and that these injuries in recent years have involved about 14 percent of the total cost of meeting compensation and leave for all disabling cases. Obviously, the severity in these cases is high. I might add that the annual toll of Government employee fatalities from automobile accidents is about 50 cases.

The most amazing thing about this vital safety problem is that, not only is there little concerted, Government-wide preventive action, but that it is almost impossible to find any reliable information on either the Federal auto accident rate or the total cost of such accidents.

Our greatest need in this area is the development of Government-wide planning to assist individual agencies in their attack on motor vehicle accidents. And the first step in such planning would be the collection and dissemination of accident and cost data by a single agency.

I propose that action be taken to coordinate highway safety activities within the Federal Government, not of course to the extent of

destroying the initiative of individual agencies (many of which are doing an excellent job) but to give some uniformity of pattern and a pooling of resources. Perhaps this could best be done through the President's Committee for Traffic Safety or through the Interdepartmental Highway Safety Board which has as a function "establishing a coordinated traffic safety program for Federal agencies." Wherever the action is to be taken, we need a more dynamic highway safety program for Federal drivers.

In summary, the Federal Government is well on its way toward achieving a satisfactory safety experience and setting the kind of example we would all like to see. However, new stimuli are needed to bring top management closer to our problems, to audit the scope and direction of agency programs, and to develop greater support in the field of traffic safety.

Our problem is not really a complicated one, but it is a big one. And as someone said once—when you've got a piano to move, you get a lot of volunteers who want to carry the stool. What we need is a really strong push at the main objective.

SAFEGUARDING HUMAN WORTH IN PUBLIC SERVICE

ARNOLD S. ZANDER, *International President, American Federation of State, County, and Municipal Employees (AFL-CIO)*

High injury rates in State and local employment are a scandal; severity rates are heart breaking. Why do we find this true in State and local government service? Why does a State government which requires by law compliance with safety standards in industry look the other way where its own employees are concerned? Why do State and local governments not know the facts, and if they do have the facts, why do they not do something about them?

Organized labor has been a powerful force in securing the passage and strengthening of workmen's compensation laws which stimulated the employer's consciousness of safety and the high cost of work injuries. Labor has been successful, too, in getting on the statute books good safety codes for industry and laws to enforce them; but little has been accomplished in the enactment of safety legislation covering State and local employees.

The lives and welfare of public employees are obviously as important as those of other citizens. Efficient government requires a minimum of employee injuries due to accidents. As an indication of the sincerity and recognition of the intent of State safety codes and regulations, it is only proper that State and local government agencies

should set an example by applying recognized safety programs and techniques to their own services. They have not done so.

Part of the fault lies in State and local government administration itself. Public officials have been too occupied with patronage. They have given no emphasis, no attention, to the problem of safety. They have been beset with costly turnover, because of the lack of a career system in government. At the same time they have been constantly pressed for funds. They are vulnerable to attacks by tax associations and by the public who have not yet been educated to the fact that if the public wants services, it must pay for them. The public must be told that millions of tax dollars are wasted by accident losses which under a safety program might be saved and used to provide expanded public services and for the recruitment and retention of competent personnel with resultant improvement and efficiency in the public service.

Neither the labor movement nor we, as the largest public employee union in the labor movement, have done what we should have to actively promote safety legislation and the establishment of safety programs at the State and local level. I will tell you why—we have been too busy fighting to eliminate the spoils system in government, working to bring up substandard wages of State and local employees, trying to get our people covered by social security. We have been too busy trying to convince unfriendly employers that public employees do have the right to participate in the determination of their working conditions, and that the results will benefit the employer as well as the employee. At the same time we are trying to improve the public service and to promote good government. These objectives: our special selfish interests for the public employee, and our interest in good and less costly government and improved efficiency of the public service, go hand in hand. One cannot exist without the other. If wages are adequate, competent personnel can be employed; if the patronage system is eliminated, a career service can be developed and the entire community benefits.

Now, you say what does all this have to do with safety in the public service? I will tell you. We cannot give the proper attention to safety unless these other vital problems of public employees are met. Our affiliates cannot give enough time to the support of safety programs in government; we cannot ourselves do what we should on the international union level while we must devote all of our resources to the resolution of the problem of recognition of the rights of the public employee, his economic status, his job security and his retirement security.

But let us look now at the State and local employee himself and his relationship to the safety problem. The average State employee in almost half of our States, the county employee in more than 90 percent of our counties, and even the city employee in some cities, is a patronage employee. He has no job security, inadequate retirement security, and no one to speak for him on his economic problems. He has his job because he is politically acceptable, because he did a service for the party in power. In other cases where he is not a political employee, he knows he serves subject to the whim of his superior unless he is fortunate enough to be an employee of one of the 28 States that have statewide civil service, unless he is an employee of one of the merit system agencies financed by Federal funds where a merit system is required as a standard of employment, unless he is an employee of a city which has a formal civil service system. Chances are he is underpaid, earning \$50 to \$100 per month less than his counterpart in industry. Unless he belongs to a union which has been formally recognized by the government employer, he has nothing to say about his employment conditions, his pay, and his working hours.

Low morale, lack of alertness, a negligent attitude, unconcern, indifference, preoccupation with other problems—these are the attitudes which characterize this employee on the job. Statistics show that far the greatest number of accidents on the job occur as the result of human error. How many of these accidents could have been avoided if the employee had been alert, content, interested in his job, self-respecting and happy in his work? What I am saying is simply this—the public employee under these conditions shows no real or deep interest in safety; he is too concerned with bread and butter issues, with holding his job, with earning a living wage. These are the first of his concerns.

We must therefore first remove these blights of the public service. For the employee, we must do something about his lack of job security, low pay, the lack of status—yes, even the lack of respect by the public for the public servant. On the part of the employer, we must help government to overcome its hesitancy in spending money for crucially needed programs. We must do this by exposing the facts and figures of on-the-job injuries in public employment. The State should not be constantly pressed for funds on which to operate and constantly attacked by the public and taxpayers associations for undertaking needed programs simply because they cost money. We must work to correct these things, and we must promote a better public image of public service. Only then can we have meaningful and effective safety

programs which will bring alleviation of hardship to workers and their families, and for government millions of dollars in savings.

And so, *what price human worth?* Will we continue to short-change our public employees? Will we continue to regard them as second-rate citizens with no real concern for them as workers and as human beings, or will we at last come to safeguard their human dignity and value, their priceless service to government and to humanity?

We in the labor movement want to help and we are tremendously impressed with the few really good programs carried on by State and local governments which have come to our attention. But we cannot remain blind to the terrible contrast in injury rates between sectors of the public and private service engaged in comparable work. For example, in electric and gas utilities the injury frequency rate in 1958 was 16.7 in government, $2\frac{1}{2}$ times the rate of 6.5 in private employment. Nor can we be blind to the fact that public employment is weighty with jobs that are rated as hazardous in the professional rating schedules of insurance companies—mental hospital jobs, sewer maintenance work, highway maintenance, automotive equipment operation, electrical work.

We call on all States to enlist the cooperation and the services that are offered by the Bureau of Labor Standards of the United States Department of Labor. Our unions want to help in this program. We believe firmly that safety must be a shared responsibility—a three-way endeavor, the State, the employee leadership, and an outside training agency, preferably the Labor Department's Bureau of Labor Standards. The employees' union can perform an important and essential function by serving as a means of communication between the employer and the employees and by insuring the cooperation and support of the employees in the safety program. A safety program is ineffectual without real followthrough in a spirit of cooperation and enthusiasm. This the union can provide. Labor-management safety committees are essential to the working of the program.

I wish I could say that our International Union Convention in May will call for the establishment of a standing committee on safety to determine policy and provide leadership from the national union level in a broad safety program for all State and local employees. I would like to see our convention ask for a full-time safety director, for the appraisal of accident experience within the membership, and for the facts as to the cost of injuries to our members. Were our resources adequate, and were our staff people available, we would be most happy to undertake these added activities.

I would like to see every local union affiliated with our federation select a safety committee and provide for the training of its members

in safety procedures. I would like to see such a committee adopt and carry on an active program, to interest all the workers in safety and to promote and sell safety to the public employer. I would like to see every collective bargaining agreement negotiated by our unions carry a safety clause. Further, I would like to see a joint labor-management safety committee established in every State and local government where we have unions, with the authority to set the ground rules for the safety programs, and to act to implement and enforce the program. I would like to see this committee inspect buildings and facilities and working conditions for unsafe and hazardous conditions and possess the authority to eliminate or correct them. This joint committee should have the responsibility of promoting safe working conditions and practices, of instructing new employees in safety measures, of removing employees from hazardous jobs, of suspending unsafe operations and of reviewing grievances and complaints. Time off without loss of pay should be allowed for committee meetings and for fulfilling committee functions.

I should like to see our international union enlist the services of the Federal Bureau of Labor Standards in conducting union safety courses at the national, State, and local union level, especially where our needs are greatest—institutional and highway services, at the State level; and streets, utilities, and public works at the county and municipal level.

The union movement in public employment has grown through the past 25 years to a position of strength, influence, and responsibility. In its building, public employees are contributing much to the development of citizenship, to the preservation of democracy and to social and economic justice for all the people of the United States. Unions are a fundamental part of government service. Let us then together work to achieve safety progress, to conserve priceless human resources and to stop needless loss of human life and skills. Let us join our forces to keep our people in their rightful places in their families and in their work, in their communities and in their country, so that they may continue to serve in dignity and with self-esteem.

WORKSHOP: SELLING SAFETY THROUGH ASSOCIATIONS IN THE TRADES AND SERVICES INDUSTRIES

*Moderator: RAYMOND C. ELLIS, Manager, Member Relations, Variety Stores
Association, Inc.*

THE SAFETY CHALLENGE IN THE TRADES AND SERVICES INDUSTRIES

WILLIAM W. EVERETT, JR., Assistant to the Chairman of the Board, Woodward & Lothrop, Inc.; representing the National Retail Merchants Association

In planning the program for this Conference, it was recognized that a vital need existed to devote a session to the safety problems in the trades and services industries. So, for the first time, a workshop is being devoted exclusively to this area.

In comparison to the many years of intensive safety activity in manufacturing, this is a relatively pioneer field. However, in trade alone accidents are being reported at a rate of over 375,000 a year. These accidents are occurring in a work force of over 18 million persons employed in over 2 million establishments. Good progress is being made in many larger companies, but the challenge of safety in trades and services is in the development of safety consciousness in the vast number of very small and widely scattered operations.

With our population expanding rapidly and with per capita consumer income rising, we are experiencing a dramatic growth of new distribution facilities. All over the country new communities are springing up around our cities and new stores and shops are moving into convenient shopping centers to meet the needs of these areas. Progress is also being made in the renewal of the downtown sections in our cities. This produces a demand for new employees in the retail and service field, and this combination of new persons employed in strange surroundings provides a real need for training in safety awareness.

The theme of our workshop session places the emphasis on selling safety. The trades and services industries exist only to the degree that



A Question From the Floor.

they can sell their products and services. As a Nation we have developed the most successful sales techniques the world has ever known, and our ability to create a desire to "buy" on the part of the individual is phenomenal. We who are concerned with safety are selling a "service" in which the end result is the most vital element a person can possess. At best, preventing an accident spares a person of physical suffering and economic loss, and under the most adverse conditions you will avoid a permanent disability or loss of life. As safety salesmen what more powerful ingredients toward making a sale could we possess? Yet, we are faced with real problems and difficulties as we become aware of the challenge which faces us in promoting safety in trades and services.

The two speakers who follow me are experts in selling safety through their association activities. The objective of my part in this panel presentation is to define the areas involved, point out the current safety picture and stimulate thought and action in areas where adequate attention is greatly needed. It is not the solution of complicated accident causes which face us, but instead a matter of understanding

human nature and designing ways and means to keep people constantly aware of simple safety hazards.

My talk has been planned as follows:

1. To define and briefly point out the size and scope of activities in trades and services.
2. By means of charts prepared by the Bureau of Labor Statistics of the United States Department of Labor to show the composition and size of the major classifications of employment and the relative size of establishments in trades and services.
3. Indicate comparison of injury frequency rate trends for trade as compared with manufacturing.
4. Show the trends of accident frequency rates for selected trade and service industries.
5. Highlight the comparison of the trend of injuries in trades and services in relation to employment over the past 20 years.
6. Finally, on the basis of this data, draw conclusions which will provide the challenge to develop maximum safety consciousness in these industries.

Chart No. 1 portrays the great number of persons employed in trades and services as shown in the bars on the left, and gives a breakdown by sizes of organizations in which trades and services personnel are employed.

First let us concentrate on the left-hand side of the chart where the bars represent the four major classifications of trades and services: wholesale trade, retail trade, services, and a group of business identified as finance, insurance, and real estate.

In total, this chart is concerned with the employment of over 18 million persons.

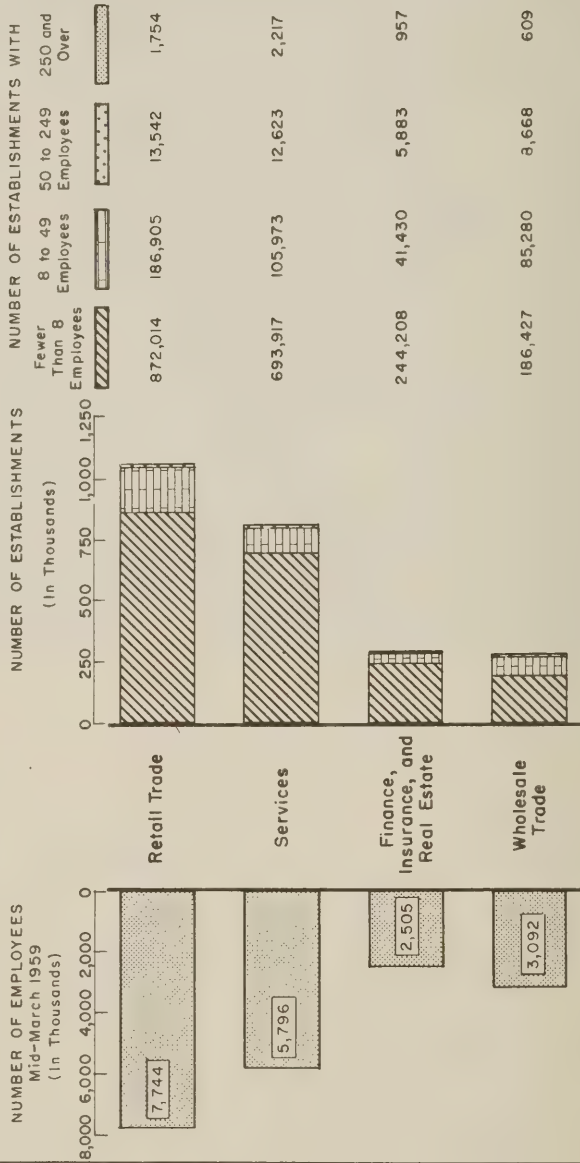
Retail trade comprises the greatest single segment with more than 7½ million persons engaged in selling goods. Almost as large is the service group where over 5½ million individuals are selling services. These two categories will be described in separate charts which follow.

The third major classification is the wholesale trade group where 3 million are engaged in the warehousing and distribution activities which support the retail and service field as well as industrial operations. This area involves both considerable clerical and office activity as well as materials handling of all types from heavy machinery to light consumer goods. The final classification is a group of office type activities which constitute the areas of finance, insurance, and real estate. Two and a half million are engaged in these operations.

Let us now relate the number of persons engaged in these major classifications to the size of the establishments in which these persons

Chart No. 1

EMPLOYMENT AND ESTABLISHMENTS FOR SELECTED MAJOR INDUSTRY CLASSIFICATIONS, FIRST QUARTER, 1959



UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS

Source: County Business Patterns, Part I, First Quarter, 1959

work. Each of the bars on the right of the chart indicates the number of places of business and the breakdown within each bar shows the number of establishments with the number of employees within certain size limits.

A study of this chart clearly shows the pattern of the large number of small business establishments in each of the major groups. The number of units in each size group is indicated at the end of the bars. A study of the table listed below indicates the consistency of the pattern of percentages of establishments in the major size breakdowns.

Here at a glance, we see the nature of the environmental accident problem. Great numbers of very small establishments, generally with the owner or supervisor and a half dozen employees involved in the operation.

Major Industries, Trades, and Services—Percent of Establishments in Size Groups

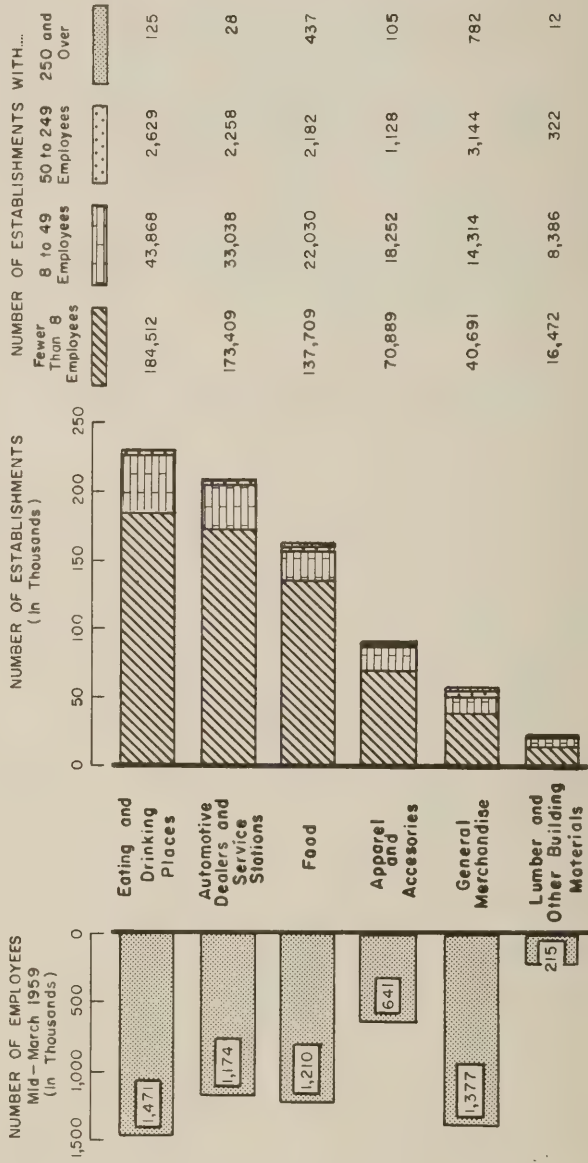
Industry	Size groups		
	0-7	8-49	Total 0-49
Wholesale.....	66.3	30.4	96.7
Retail trade.....	81.2	17.4	98.6
Finance, insurance, real estate.....	83.5	14.2	97.7
Services.....	85.2	13.0	98.2

Chart No. 2 shows the composition of the retail field which is the largest group in trades and services. Here we find the consumer outlets to satisfy our needs for food, clothing, shelter, and automobile transportation. The greatest number of persons, over 2½ million, are engaged in meeting our retail food requirements. The largest single group are those operating eating and drinking establishments where almost a million and a half are engaged. A slightly less number are engaged in selling food in stores. So we have the picture of approximately 30 percent of our retail work force employed to meet the continuous requirement of everyone to eat.

Retail stores selling general merchandise are next in the size of the classification in retail trade. Here we find over a million and a quarter persons selling merchandise in establishments ranging from large department stores through a large group of limited price variety stores, mail-order houses and a great number of establishments known as general merchandise stores.

Chart No. 2

EMPLOYMENT AND ESTABLISHMENTS FOR SELECTED RETAIL TRADE INDUSTRIES, FIRST QUARTER, 1959



UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS

Source: County Business Patterns, Part I, First Quarter, 1959

To meet the needs for clothing specialization, a large group of stores known as apparel and accessory stores are found in almost every community. More than half a million persons make up this activity.

A smaller group of retail outlets supply the home owner and others with the materials required in building and maintaining structures. Some 200,000 persons are found in this activity which requires considerable materials handling and relatively heavy warehousing operations.

Again, we relate these large numbers of employees to the sizes of the establishments in which they work and we note the great majority working in small places of business.

The figures for the number of the units in each group are noted on the chart, and the table below indicates the consistent pattern of the percent of establishments in each size group by retail trade classification.

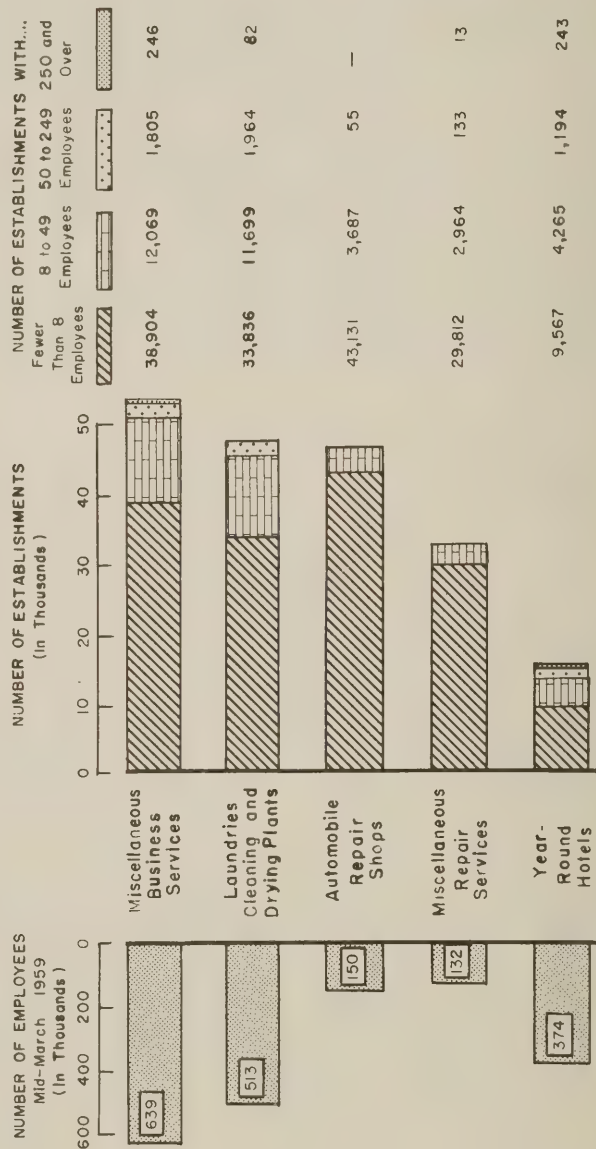
Retail Trade Industries—Percent of Establishments in Size Groups

Industry	Size groups		
	0-7	8-49	Total 0-49
Lumber and building materials.....	65. 4	33. 3	98. 7
General merchandise.....	69. 0	24. 3	93. 3
Food stores.....	84. 8	13. 6	98. 4
Auto dealers and service stations.....	83. 1	15. 8	98. 9
Apparel and accessories.....	78. 4	20. 2	98. 6
Eating and drinking.....	79. 8	19. 0	98. 8

Chart No. 3 shows the general composition and the continuous pattern of many small units of operation in the service industries. The selected fields on the chart show the major hotel group, the large number of laundry and cleaning establishments, as well as miscellaneous business and repair services. In addition to these classifications, this field is concerned with medical and other health services, as well as the amusement and educational fields.

Chart No. 3

EMPLOYMENT AND ESTABLISHMENTS FOR SELECTED SERVICE INDUSTRIES, FIRST QUARTER, 1959

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS

Source: County Business Patterns, Part I, First Quarter, 1959

The table noted below is further evidence of the pattern previously established of the great number of widely scattered small service operations.

Service Industries—Percent of Establishments in Size Groups

Industry	Size groups		
	0-7	8-49	Total 0-49
Year-round hotels.....	62. 7	27. 9	90. 6
Laundry and dry cleaning.....	71. 1	24. 6	95. 7
Miscellaneous business services.....	73. 4	22. 8	96. 2
Auto repair shops.....	92. 0	7. 9	99. 9
Miscellaneous repair shops.....	90. 5	9. 0	99. 5

We now have an appreciation of the diverse composition of industries which make up trades and services and have established in our minds the pattern of many small places of business.

We now turn to a graphic presentation of the accident frequency trends in trade compared with manufacturing for the past ten years. Chart No. 4 shows the progress which has been made in the manufacturing field in reducing accident frequencies, especially in the years 1950 to 1954. On the other hand, trade has continued at about the same level with periodic improvements and increases in frequency rate.

For a better understanding of the major factors which are influencing the overall pattern, let us examine chart No. 5, which breaks down trades and services into six major groups.

For the benefit of those not familiar with injury frequency rates, let me explain that the rates noted on the vertical axis are computed by taking the annual number of injuries times one million, divided by the actual number of man-hours worked in each of the industry groups charted. This is a standard formula which is basic for an understanding of how an individual organization compares with another of its type for the industry average as shown on this chart.

We note on chart 5 that improvement is shown in the lumber and building industries as well as the hotel group. The auto repair shops and garages group had a favorable trend from 1952 through 1955 but then rose sharply through 1957. A tapering off has begun in 1958 and it is hoped that the previous lows can be reached again. The retail areas as well as private hospitals show a fairly even trend over the past 10 years.

This is the chart which gives us the real challenge to renew our efforts to reduce the frequency rate in the areas for which we have

Chart No. 4

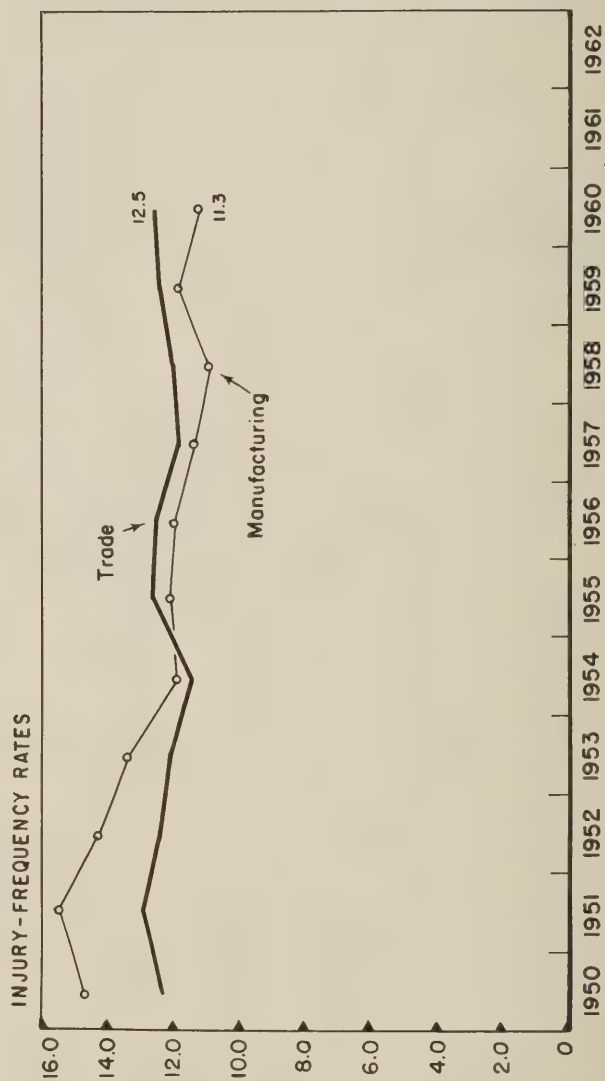
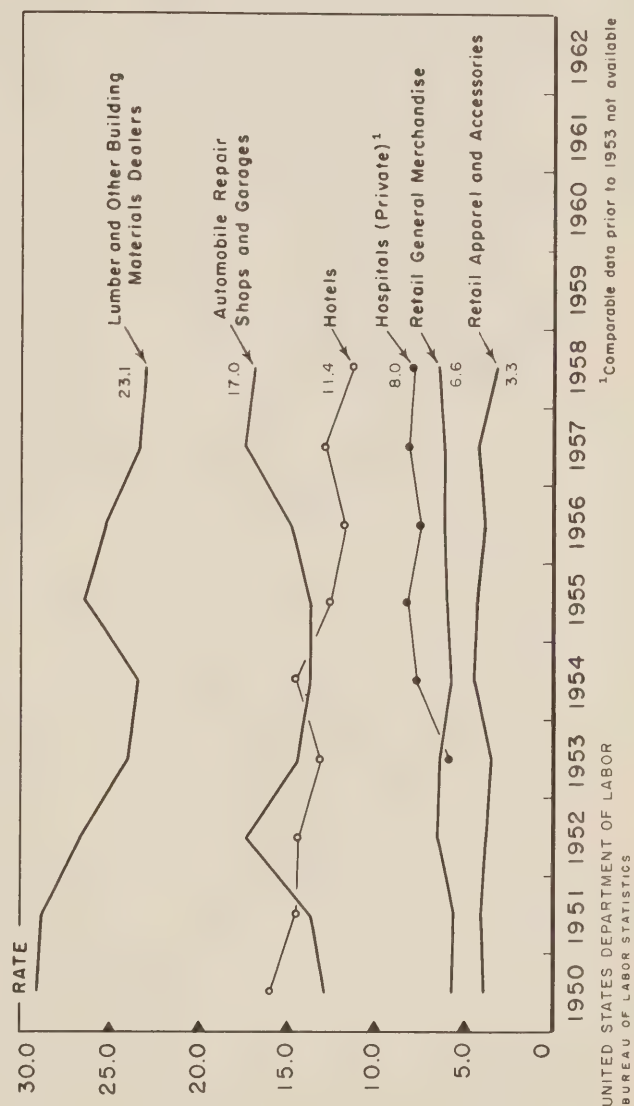
INJURY-FREQUENCY RATES IN TRADE COMPARED
WITH MANUFACTURING, 1950-60UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS

Chart No. 5

INJURY-FREQUENCY RATES FOR SELECTED TRADE AND SERVICE INDUSTRIES, 1950-58



concern. We all want to see a declining rate as the result of our safety efforts.

In the final chart, No. 6, we present a 20-year trend of work injuries compared to the employment rise in the area of trade. As business expanded after the war years, we note the rise in injuries was steeper than employment during 1945 to 1947. The next 4 years showed an improvement followed by a general rise through 1953. Since 1953, employment has been rising faster than injuries, but for the few years ended in 1960 there has been a rather steady rise in work injuries. We note that the figures for 1961 indicate a checking of this rise, as the employment remains on a level trend.

Thus, to summarize the trend charts, we need more emphasis on a continuing improvement of our injury trends. The efforts made by the hotels and the building industry to reduce their rates can serve as an incentive to other industries, and all organizations are urged to check their frequency rates over a period of time.

With all the foregoing evidence in mind regarding the vast number and diverse composition of small establishments in the trades and services industries, as well as an understanding of the need for improvement in accident frequencies in these areas, let us turn to the challenge of the future.

These are the areas into which the challenge can be divided:

1. The types of appeals which can most effectively stimulate safety consciousness.
2. The need for more data on accident causes and trends of accidents in various industries.
3. The best medium to reach the widely scattered establishments in trades and services.

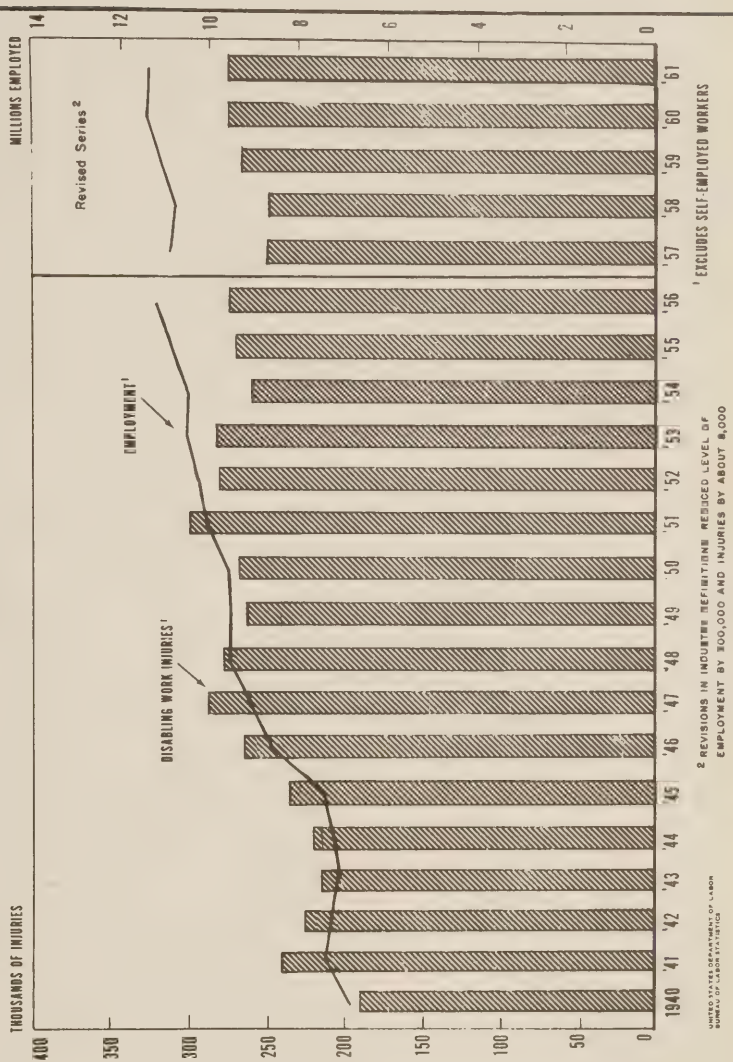
1. In selling safety through associations, what are the types of appeals which will be most successful in stimulating interest in accident prevention especially in smaller operations?

(a) The humanitarian concern for the individual. We all have a basic sensitivity toward pain and suffering, and the result from a preventable accident is a powerful appeal to most individuals. This is especially true in small groups of people where a close relationship exists as in most trades and services establishments.

(b) The economic hardship to both the employer and employee. Temporary loss of time poses a difficult situation in many establishments especially due to the sudden and unexpected nature of the disturbance. It is often impossible to secure a replacement for an indeterminate time and this results in economic loss and hardship for others during the interim period. The individual and family also face a loss in total earnings as well as increased expense for the care of the injured.

Chart No. 6

DISABLING WORK INJURIES IN TRADE RELATED TO EMPLOYMENT 1940 TO 1961



2. A more effective compilation of accidents occurring in small business is needed with an emphasis on the factors which cause accidents. These should be used to emphasize the steps which can be taken in the future to avoid many accidents of the same type.

Many sources of data exist which are gathering information for their own purposes. These include insurance carriers, the National Safety Council, State agencies concerned with workmen's compensation administration, and the Department of Labor of the Federal Government. A local or national association concerned with a group of related businesses can perform a most valuable service in analyzing accident information and then extracting specific points concerning the operation of their members. It is my opinion that the "rifle approach" to the most important accident causes which can be dramatically publicized is better than the "shot gun" generalizations.

3. The industry association in its role as representative of many member organizations with common interests is in a unique position to reach and stimulate interest in safety. Through their established means of communication, pertinent ideas on safety can be readily conveyed to large numbers of association members. In addition, opportunity for discussion of common problems relating to safety is afforded by the meetings of association members, and this is of special value in local groups. Here is a tangible area in which good results have been obtained in several associations representing trades and services. This will be discussed in depth this afternoon, from the standpoint of the local and national association programs.

The theme of this 1962 Conference, "Safeguarding Human Worth" provides the key to the challenge of the future for maximum safety activity in trades and services industries. Management must provide all the necessary physical safeguards to reduce to a minimum the chance of an accident occurring, but in addition, an effective program of training and selling an awareness of accident hazards must be promoted. It is in this area of human motivation, and the patient and continuous effort on the part of those responsible for a business to develop a natural safety consciousness, which carries through every hour of the day. You cannot isolate safety into specific areas, for an accident can occur anywhere; and in trades and services, it is the common fall that is the most potent cause of injuries.

The very existence of a trade and service establishment is dependent upon its ability to create a consumer need and then effectively meet the need so as to consummate a sale. Let us put the same imagination, drive, and everlasting patience into our daily safety efforts that we use to sell our products and services, and we will meet the safety challenge.

SAFETY PROGRAM OF THE HOTEL ASSOCIATION OF NEW YORK CITY

LESLIE J. INCH, *Director, Accident Reduction Department, Hotel Association of New York City*

My remarks will be based chiefly on the activities of the Accident Reduction Department of the Hotel Association of New York City for its 160 member hotels and their 35,000 employees. This department of the Association has been in existence since 1945. Certain facts relating to its development and its method of functioning will be of interest to those of you who now have, or are planning to organize, safety departments. After all, the reason for this session is to stimulate action on the part of association members and to develop and improve safety programs within their association.

By way of background, which will explain what we are endeavoring to accomplish, back in 1932, when many New York City hotels—in fact, hotels in many sections of the country—were finding it too difficult to meet their interest and taxes, a few foresighted, safety-minded hotelmen got together and organized what became known as the Hotel Section of the Greater New York Safety Council. Their aim was to promote safety measures within hotels and to develop policies for educating hotel employees in safe practices as well as to stimulate their interest in systematic procedures that would prevent accidents. This hotel section continued to grow as the years went on, but it was not until the late 30's that the informal support of the Hotel Association was sought in furthering the group effort. Unfortunately, however, cooperation was confined chiefly to those hotels that had representation actively engaged in the committee's work within the Greater New York Safety Council; less than one-third of the membership of the Hotel Association of New York City.

In 1944, the Hotel Association gave formal recognition to the accomplishment of the Hotel Section of the Council and authorized the setting up within the Association, as a standing committee, a safety committee, the membership of which comprised the Executive Committee of the Hotel Section of the Council. This new committee immediately moved toward making their work a direct activity of the Association wherein all members might participate without the payment of any fee other than their regular association dues. Studies were made by this committee to ascertain the most practical method of expanding their activities. As a result, it was recommended to the Board of Directors of the Hotel Association of New York City in February 1945 that a new department be set up within the Association. Its purpose: to encourage all the members to participate in

accident prevention and to develop ideas which might bring about greater safety in hotel operation, reduce the number of lost-time accidents, and eventually develop more favorable experience ratings for individual members. The Board of Directors authorized the establishment of such a department to take over and expand the activities formerly performed by the Hotel Section of the Council. Harry A. Mason, now retired, was appointed the first director of the activities of this committee.

One of the first steps projected by this department was a survey of member hotels to ascertain their 1944 accident reports, obtain the names of their insurance carriers for both workmen's compensation and public liabilities and to get authorization to secure from the rating boards and their insurance companies any data which would be beneficial in developing and setting up records. The hotels were, in general, most cooperative and in a short time we had a rather comprehensive picture of the employee accident record of most of our members for 1944.

We next made a survey of the experience rate modifications of each member hotel as they affected the hotel's individual workmen's compensation insurance premiums. These figures, once obtained, were completed against the standard manual rate and released in a comparative report, each hotel being designated by a confidential code number known only to the hotel and the Association. From this we were able to show what hotels were paying high premiums because of bad accident records in the past and those that had been doing a good job in safety and therefore had a reasonably low premium rate.

The data obtained from hotels also furnished us with a basis for comparing the accident ratios per employee in each hotel. From these ratios we could pick out those hotels whose current records needed correction. For those hotels whose current accidents indicated that they were sorely in need of safety education, we contacted the insurance carrier, and together with one of its representatives, we met with the manager of the hotel, went over the accident records, discussed the causes and arranged, wherever possible, the adoption of a systematic safety program.

In the initial phase of our activities we endeavored to impress upon our members the necessity of maintaining a safety program at all times. We tried to show them by facts and figures how their safety records are reflected in their workmen's compensation premium rate and how a bad record can more than double the cost that might be possible if a good record were maintained. We sought to bring home

to them the fact that they, themselves, can determine in a large degree how much their workmen's compensation insurance premiums will cost by the type of safety record they turn out. We stressed that this is a long-range program. Therefore to save money in future years, it is necessary to begin building up a good accident record now.

As an example of how this worked out and is still working out, in 1944 the manual premium rate in New York State was \$1.65 for each \$100 of payroll. It then rose steadily until it reached \$2.53 in 1953; then it gradually dropped and in 1961 it was \$1.65, the same as it was in 1944. (See Fig. 1, p. 266.) Since 1946 we have been making comparison of all the hotels as to the charges or credits that are applied to the manual rate. In 1960 with a basic rate of \$1.80 before deductions for discounts or dividends, the hotel with the greatest credit paid \$1.13 while the hotel with the highest charge modification paid \$2.59 per \$100 of payroll. The difference is \$1.46. Apply these rates to an annual million dollar payroll and you can see the dollar saving. The irony of these comparisons lies in the fact that both hotels received the identical insurance coverage yet one paid \$1.13 while the other paid \$2.59.

Our next move to put across our safety message was to inaugurate in April 1945 a monthly bulletin known as "Star News." The word *Star* being the first letters of our slogan, "Save Through Accident Reduction." In these releases we have discussed varied topics relating to accident control along with short news items. We stress the role that management must play in sponsoring a safety program and how, before accident control can become a reality, top management must give its blessing to the activity. We outline methods of safety with special attention to instruction of new employees. We prepared and distributed safety posters, safety rules for employees, and specific suggestions for inspectors to follow in spotting danger points. In short, we use every known means to keep safety first and foremost in the minds of hotel operators.

Believing that competition is an effective means of arousing interest and enthusiasm in any activity, our department instituted on January 1, 1946, an inter-hotel Accident Reduction Competition to determine the hotel that could develop the lowest lost time accident frequency ratio. For the first 12 years we ran this on a 10-month basis. The contest now runs for the full 12 months. The first year we had 104 hotels participating with 53,660,745 man-hours, 747 lost-time

injuries—frequency rate of 13.92. In the last year (1961) 113 hotels—67,532,752 man-hours—615 injuries—rate 9.11. Our best year was 1957—161 hotels—60,024,395 man-hours—491 lost-time injuries—rate 8.18.

In this contest, we group hotels according to size:

Group A—Large transient hotels

Group B—Large semi-transient and resident hotels

Group C—Hotels with over 30,000 man-hours per month

Group D—Hotels with 20,000 to 30,000 man-hours per month

Group E—Hotels with 10,000 to 20,000 man-hours per month

Group F—Hotels with 10,000 or less man-hours per month

Each year we award safety plaques to those hotels which have had no lost-time injuries and to the hotel that is first in each grouping. Last year 30 hotels had no lost-time injuries. These plaques are awarded during the Safety Convention and Exposition sponsored by the Greater New York Safety Council each year.

You will recall that I said the contest originally ran for 10 months. When we decided to award the plaques at the Safety Convention we extended the contest to a full year and made the award as part of our session. In addition, we usually declare the week of the convention as Hotel Safety Week and run a contest in which all the employees of member hotels are eligible for cash prizes. In the past we have had a Limerick Contest Cartoon Slogan. Each year the participation is greater than the previous and the comments from hotel employees and employers have been excellent.

Twice a year we compile statistical data relative to the accidents that have happened during the past 6 months. These are broken down into the type of accident, falls, strains, cuts, burns—lost-time accidents by categories—loss of time by department—frequency of accident by department and average days lost per lost-time accident. In the 6 months ending December 31, 1961, we came up with the following facts and figures.

A Review of Lost-Time Accidents by Hotels

*Comparisons of accidents and days lost
by percentage ratios*

Second half

1961

(Percent)

Comparative frequency of accidents by categories:

Falls	42.4
Strains and sprains.....	14.8
Bumps and bruises.....	19.3
Cuts	8.6
Burns	5.8
All others.....	9.0

Comparative loss of time by categories:

Falls	55.7
Strains and sprains.....	17.7
Bumps and bruises.....	13.1
Cuts	4.6
Burns	3.4
All others.....	5.5

Comparative loss of time by departments:

Housekeeping	38.8
Kitchen and steward.....	20.0
Dining room.....	16.0
Engineering	11.7
All others.....	13.5

Comparative frequency of accidents by departments:

Housekeeping	33.4
Kitchen and steward.....	24.8
Dining room.....	15.9
Engineering	11.4
Front service.....	7.9
All others.....	6.6

Average days lost per L. T. A.:

(Days)

Housekeeping	25.6
Kitchen and steward.....	17.8
Dining room.....	22.2
Engineering	22.7
Front service.....	19.9
All others.....	21.5

Early in 1952, certain member hotels formed what is known as the Hotel Safety Trade Group, which began with eight members. The current membership is 73.

Only members of the Association are eligible to participate in this group. In addition, participation is purely on a voluntary basis.

The purpose is to promote accident prevention and improve claims handling thereby obtaining a reduction in insurance premiums. The hotels currently members of the group were paying \$1 million for workmen's compensation insurance in 1952. This year, after dividends and discounts, this premium will have been reduced to just under

\$500,000. These hotels averaged over 2,000 accidents per year prior to the formation of the group. This last completed year there were 1,009 accidents. Some individual records are as follows:

Hotel A: The 1952 premium was \$45,000 on a payroll of \$1,800,000. In 1959 the premium dropped to \$32,600 on a payroll of \$2,600,000. These are premiums paid to the State Insurance Fund before dividends were taken into consideration.

Hotel B, an average sized hotel: The premium in 1952 was \$15,750 on a payroll of \$580,000. In 1959 the premium had dropped to \$8,600 on a payroll of \$768,000.

Hotel C: The 1952 premium was \$8,150 on a payroll of \$233,000. The 1959 premium was \$3,280 on a payroll of \$385,000.

In order to accomplish this, certain requirements have been set up and are rigidly enforced in the group operation. Each hotel is required to have a safety program satisfactory to the executive committee and the group manager. They are required to use preplacement physicals on all new personnel. The State Insurance Fund, which underwrites the group, makes an agreed number of safety inspections dependent upon the size of the hotel, with reports filed in the group manager's office. All claims must be filed immediately by the hotel to the group manager's office. The claims receive preliminary action before they are sent to the carrier in order to determine the facts in the case.

The subcommittee of the executive committee meets once each year and reviews the individual record of each hotel. If they are found to be neglecting their duties as members of the group, they may be relieved of their membership. This is done to insure compliance with the rules and regulations.

The group manager retains an attorney at the Workmen's Compensation Board who represents each hotel on every action brought against that hotel. In many of the cases wherein the question of the legality of the case is involved, we actually assist the claimant by obtaining a prompt and fair settlement. In the rare instance where the claim made is a false one, it is our job to see that the case is disallowed.

In the 1,009 cases reported during the last completed group year, there were 36 controverted cases which were not believed to have risen out of employment. Twenty-four of these cases were closed in favor of the employer. The balance of the cases are still open.

There were 542 hearings held during the same group year for member hotels at which they were represented by legal counsel. Many other activities come within the sphere of proper claim supervision which are too detailed to go into at this time. Our group represents

a venture into the active prevention of accidents thereby obtaining a substantial reduction in insurance premium.

Our aim is to instill in the minds of each and every one of our members the conviction that accident prevention is just as important in his daily routine as any other phase of his operation. We are endeavoring to make him thoroughly safety-minded and constantly on the alert to see that every possible safety precaution is afforded his guests and employees; that a systematic plan of safety education is maintained for the training and supervision of his employees; and that they in turn perform their assigned tasks with safety to themselves, their fellow employees, and guests. We continually urge careful and frequent inspections of physical properties and the constant observance of the safety habits of the employees. We ask that each unsafe condition or act be promptly reported by each employee to his supervisor. We also ask that when an accident occurs, the details of the accident be fully and promptly recorded on a Standard Report of Accident Investigation form and if an employee is injured, regardless of how minor the injury might seem, that it immediately be reported to his supervisor. We recommend that an active safety committee be maintained in each hotel and that this committee, in co-ordination with management, supervise the application of a safety program adapted to the hotel, being certain that all safety rules and regulations are strictly obeyed as are all other orders or directions of management. If we can attain this goal we will have reduced accidents materially.

I want to inject a note of warning to those who may be considering a safety program for group application. Don't expect too much in the beginning. No doubt you will meet with negative reactions in some quarters and you will probably receive only passive acceptance in others. The visible results of your efforts may be almost negligible some time, no matter how extensive or intensive your endeavors or how successful they may seem to be. You must always bear in mind that accident control is a long-range project. It may take years to reflect the benefits achieved today.

Education, plus application, plus cooperation of all persons concerned are necessary to achieve positive results. These requisites are not easy or quick to secure, especially if some of the members of the group are speculative owners with little or no interest in benefits that may accrue in the future. Begin your program with an avowed purpose of aiding those who want, or are willing to accept, your assistance. Start with a solid foundation upon which you can build and expand as your safety education progresses. An accident control program well developed and consistently carried out is bound to win in the end, but it will take perseverance.

The period during which safety and accident prevention activities have been under the supervision of the Hotel Association of New York City has produced results. The reduction in the number of accidents over the years has produced material savings and we hope that it will become greater in the years ahead. We believe that we are offering our members a service—the kind of service they need and which will reflect its benefits manifold to those who heed our suggestions and consistently follow our byword, “Save Through Accident Reduction.”

FIGURE 1

Workmen's Compensation Insurance Manual Rate—Hotels, New York State

1944 -----	\$1. 65	1953 -----	\$2. 53
1945 -----	1. 91	1954 -----	2. 50
1946 -----	2. 30	1955 -----	2. 20
1947 -----	2. 30	1956 -----	1. 95
1948 -----	2. 23	1957 -----	1. 75
1949 -----	2. 21	1958 -----	1. 80
1950 -----	2. 20	1959 -----	1. 80
1951 -----	2. 50	1960 -----	1. 80
1952 -----	2. 48	1961 -----	1. 65

SAFETY PROGRAM OF THE AMERICAN HOSPITAL ASSOCIATION

JACK DILLMAN, *Field Counselor, Hospital Counseling Program; Staff Representative—Safety, Council on Administrative Practice; American Hospital Association*

I am happy to discuss with you the safety program of the American Hospital Association. This subject has long been a serious and vital one to those responsible for the care of the sick and injured. This concern for safety was perhaps originally and most effectively articulated in the late 1800's by Florence Nightingale who said, “It may seem a strange principle to enunciate as the very first requirement in a hospital that it should do the sick no harm. It is quite necessary, nevertheless to lay down such a principle.” This principle has been observed and nurtured by responsible hospital officials ever since. It has also been expanded to include not only patients but hospital personnel and visitors.

The formation of the American Hospital Association provided a mechanism through which the principle of hospital safety could be encouraged and fostered. Early records and publications of the Association clearly indicate its concern for safety.

In the late thirties the effectiveness of industrial safety programs in reducing the cost of workmen's compensation insurance and the growing problems of liability coverage, prompted the Association to establish a “Committee on Insurance.” A year later this committee

was renamed, "Committee on Insurance and Safety." Since that time a unit of our organization has been responsible for the development and promotion of safe practices in hospitals. In 1944 a separate "Committee on Safety" was established. In 1948 collaboration with the National Safety Council was initiated. This collaboration continues and is an integral part of the overall safety program of the Association.

Historically, safety activities have fluctuated as new areas of need became apparent. The Effingham fire in 1949 rekindled the interest in fire safety programs. The loss of immunity in several States prompted an intensive program for identifying and eliminating operational hazards. The increasing costs of professional liability coverage have given impetus to programs directed at reducing accidents involving patients. The war years sparked interest in evacuation techniques. Several natural disasters prompted great concern for programs which would enable hospitals to adequately handle mass casualties. A written and rehearsed disaster plan is now required before approval by the Joint Commission on Accreditation of Hospitals can be obtained.

During and between periods of special emphasis a continual program of education and promotion has been conducted by the American Hospital Association to provide hospital personnel with the latest information, tools, and techniques to constantly improve their safety programs and records.

The on-going safety activities of the American Hospital Association fall into six broad categories: publications, education programs, research, representation and coordination with other agencies, promotion, and the joint American Hospital Association and the National Safety Council hospital safety program.

Publications

The publications of the American Hospital Association constitute the basic channel for disseminating information to our membership and promoting programs. The following is a partial list which indicates the type and variety of the publications pertinent to the subject of safety.

Hospitals

The official journal of the association, published bimonthly, contains timely articles and announcements of interest to hospital personnel. Articles relative to safety are frequently included.

Cumulative Index of Hospital Literature

Published every 5 years (annually as the Hospital Literature Index) is an author and subject index to more than 400 journals in the hospital and related fields. This is a vital reference document on all hospital subjects including safety.

Manuals

These association textbooks provide basic technical and procedural information on a great variety of subject matter.

Those specifically related to safety include:

Development of Fire Emergency Programs; Emergency Removal of Patients and First-Aid Fire Fighting in Hospitals.

A joint publication of the American Hospital Association and the National Safety Council, it was written by Lt. Robert McGrath, formerly of the Chicago Fire Prevention Bureau. The program of instruction developed and illustrated in this manual has been adopted by hospitals and fire officials all over the country.

Hospital Safety Manual

This manual is the basic document in the field. It was published jointly by the American Hospital Association and the National Safety Council. It is currently in its fourth printing. We estimate that nearly 18,000 copies have been sold or distributed to hospitals and others.

Principles of Disaster Planning for Hospitals

Reading in Disaster Planning for Hospitals

Preventive Maintenance Guide

Miscellaneous Publications

Include pamphlets, forms, official statements and brochures. Safety subjects in this category include: Fire Extinguisher Check List; Principles of Hospital Safety; Incident Report Forms; Statement on Physical Identification of all Hospital Patients; Guiding Principles for an Occupational Health Program in a Hospital Employee Group; Bedside Manner.

The latter is a joint publication of the American Hospital Association and the National Safety Council designed to explain the details of a hospital room and suggested safety practices for patients and visitors.

What Hospitals Should Know About Investigational Drugs

A Guide for Identification of Newborn in Hospitals

A copy of virtually all publications is sent to each member hospital as part of the membership service. Additional copies may be purchased from the association. Distribution of these publications is not limited to member hospitals.

Educational Programs

During the past 10 years the association has conducted institutes and seminars on hospital safety throughout the United States. Attended by hospital administrators, physicians, nursing personnel and

others, these programs include instructional sessions on virtually every phase of hospital safety.

The staff of the association also actively participate in planning safety programs with other hospitals and health organizations.

Research

Research activities in safety are informal and currently are confined to the conduct of surveys, collection of data and working closely with other organizations, manufacturers, architects and institutions in developing and improving hospital equipment, design and safety procedures.

Coordination With Other Agencies

Hospital personnel, representing the association, participate in the activities of many other agencies such as the National Fire Protection Association, American Standards Association, United States Department of Commerce, and the Joint Blood Council. Through this participation, standards and codes have been established which have made significant contributions to hospital safety.

Some of the standards and codes include:

National Fire Protection Association—

“Flammable Anesthetics Code,” Bull. 56;

“Non-Flammable Medical Gas Systems,” Bull. 565;

“Building Exit Code” (Hospital and Institution Section), Bull. 101.

American Standards Association—

“Safety Code for Laundry and Dry Cleaning Equipment”;

“Standardization of Anesthetic Equipment”;

“Pin Index System for Anesthetic Equipment.”

U.S. Department of Commerce—

“Simplified Practice Recommendation R-176 Color Markings for Anesthetic Gas Cylinders.”

Promotion

Through the journals, newsletters, announcements, letters and educational programs our membership is kept informed of new developments pertinent to safety in hospitals. Our promotional efforts are not limited to our own programs and publications, but include those of other organizations which may be informative and useful to hospital personnel.

Joint Hospital Safety Program of the American Hospital Association and the National Safety Council

This is a comprehensive safety program for hospitals, conducted jointly by the American Hospital Association and the National Safety

Council. The staff of the National Safety Council has been largely responsible for the content of this service. Consultation and promotion has been continually provided by the American Hospital Association's committees and staff.

The Hospital Safety Service

This service provides a monthly hospital safety newsletter and packet of materials including posters, announcements, data sheets and other pertinent information. Average annual enrollment in the hospital safety service is approximately 1,300 hospitals. Enrollment has shown a steady increase since it was started in 1949.

The Hospital Safety Contest

This contest is conducted annually by the National Safety Council to encourage the observance of safety practices among hospital employees. Since its inauguration in 1956, it is estimated the 1,500 hospitals have participated. Participating hospitals receive a certificate of participation. Winners in each category receive plaques and certificates and all hospitals having a perfect record receive a certificate of recognition for outstanding performance.

Safety Material

Much material has been prepared jointly. This includes a safety-graph on patient safety, posters, data sheets and numerous publications.

The close association of the American Hospital Association and the National Safety Council has promoted the efficient and fruitful use of the facilities, personnel, and resources of both organizations to produce a coordinated program to promote safety in hospitals.

The American Hospital Association's participation in the promotion of safety in our workplaces is only a manifestation of our members desire to provide the safest possible environment for our personnel and visitors and, in the words of Florence Nightingale to "do the sick no harm." Our work will never be completed because changing patterns of health care and technological advances in facilities, equipment and techniques are constantly introducing new hazards and problems. We believe that the association provides an effective mechanism for meeting these constantly developing challenges. Through the association one member's problem becomes the problem of all members and conversely one member's solution to a problem is available to all.

Our greatest current need, as I'm sure it is yours in the service industries, is to devise a program which will create an informed and conscientious public, aware of the contribution it can make to our efforts in behalf of public safety. This Conference can, I believe, make a significant contribution to the resolution of this problem.

WORKSHOP: OFF-THE-JOB SAFETY

Moderator: M. F. BIANCARDI, Manager, Safety Services, Allis-Chalmers Manufacturing Co.

OFF-THE-JOB SAFETY—WHAT ARE ITS PROBLEMS?

JOHN V. GRIMALDI, Consultant, Safety and Plant Protection, General Electric Co.; President, ASSE

Picture the population of New York City or the entire State of Michigan disabled by injuries in 1 year, and the awesome off-the-job accident totals may have a new significance. Perhaps, merely the news that 7,450,000 Americans suffered accidental disabling injuries*, while engaged in personal pursuits, should shock us into swift and decisive corrective action. But the impact of large numbers seems to have been lessened some time ago. Or it may be that their immensity is difficult to believe. Can it be possible, for example, that this total of almost 7,500,000 represents a percent of the Nation's population (4.1%) about equal to that (4.3%) of men wounded among all who served in all the wars the United States has had to fight, including the Korean action? It does. In absolute numbers, the American at leisure, it seems, is little safer than when facing a deadly enemy on the battlefield.

In 1960, 93,000 died accidentally; 79,200 of these deaths had no occupational connection. It is a total almost 5,000 greater than the American battle deaths in World War I and it occurs every year with only slight variation. Every person of good conscience cannot help but be concerned with this frightful subtraction of time and skill from our society. Each must wonder why the situation exists. What are the handicaps to off-the-job safety progress? Who should assume responsible charge of the corrective program?

Long before the situation became as aggravated as it is, employers reacted to the need for off-the-job safety. The genesis of the National Safety Council is an example. Originally the National Council for Industrial Safety, it was formed in 1912 by businessmen who knew the need for exchanging the best ideas in accident prevention. Its name shortly afterwards was changed to the National Safety Council

*Off-the-job accidental permanent impairments and temporary total disabilities in the most recent year (1960) for which data are available.



Dr. John V. Grimaldi Addresses Off-the-Job Safety Session.

when its founders sensed that the correction of industrial hazards would be a small part of the national safety problem. Since then the Council's budget steadily has been increased and its program broadened to cover all the important activities in which people experience accidents. Today, industry is the largest contributor of funds that support the Council's attack on non-industrial accidents.

The off-the-job accident totals certainly would be far greater without the persistent attack of the Council and its allied organizations. Yet, the situation has remained grave. In America, where human values are held most highly, accidents are the one threat to life and happiness which people seem to accept as a matter of course. Only in the case of occupational safety have the greatest preventive accomplishments been made. Perhaps this is because today moral firmness and a regard for human values are added ingredients in the prescription for business progress. People are the principal consideration of business and pleasing them is its ultimate purpose. The business

that fails to anticipate and meet the needs of people, whether they are employees, customers, vendors, or neighbors, will not be permitted to continue. Safety is a sensitive need which employers largely recognize is best met as fully as possible.

But the desire to meet its responsibilities to people is not the only motivation for industry's safety achievement. Another strong stimulus is the necessity that all employees work up to their jobs' standards if the business is to be successful. Safe work practices and conditions are just part of the necessary correct performance requirements. Unfortunately there is no clear, uniformly accepted concept at present of what precisely are the components of safety success. In the United States, we depend heavily on communicating the desirability for practicing safety. Probably every known teaching medium and method is tried or relied on to create an aura of safety awareness. This intense activity must have some influence on the behavior of employees, but it is more likely that industry's safety accomplishments are due to capital improvements in plants and equipment as well as management's increased ability to persuade employees to work correctly. There is good evidence that the desirable occupational safety experience is a corollary of good managerial practices, which are motivated of course by the need to keep the enterprise healthy and safe from the many uncertain business hazards it is exposed to from time to time. Thus we come to the first of a series of decision considerations for the employer as he weighs the off-the-job safety problem. He is concerned about off-duty accidents, but puzzles over how he can most effectively improve the unhappy situation and whether his efforts would have any real influence after all.

Let us consider the possibility of effectiveness first. Assuming that the employer is aware that on-the-job safety accomplishments are a function of his ability to control the work environment and its practices. The opportunity to effect such control does not exist for him in off-the-job situations. His only direct effect can be through communicating to his employees the need and knowledge to prevent off-the-job accidents.

Unfortunately, however, people cannot be taught to be *safe*. They can be educated and stimulated to be safer, but not safe—in the absolute sense. The contrariness of people is a most perplexing problem. Human behavior sometimes is so wayward and illogical that anyone who deals with people soon finds his blood pressure hammering from the countless frustrations. The employer's principal direct influence on his associates' off-the-job safety experience relies on teaching and communicating methods. He must wonder, therefore, where the point of no return may be, since employees everywhere are exposed to some

degree of safety advice from local and national safety organizations, the employer's on-the-job safety programs, as well as other sources. Besides, there is the perplexing question of whether an employer's off-the-job safety program can have significant effect if other employers in the community do not contribute equally strong programs.

This brings us to another problem. In order to plan, organize and guide any program effectively it is imperative that there be valid and reliable measures of the activity's progress. The questions of how much time and money should be spent and where the investment should be made to achieve an expected degree of success, should be answerable with reasonable and tangible facts. While a measure of off-the-job safety experience has been proposed, it is only a very brief step in this needed direction. Without a suitable means for measuring effectiveness, it can be expected that there will be a prudently cautious approach to investing in the activity.

Inasmuch as the most an employer can do to persuade employees to follow safety precepts when off duty is to inform them, the bothersome question occurs, "Will such advising be viewed by the employee as an invasion of his privacy?" While writing this paper, I have before me a survey of the communications activity in a major company. The report is concerned with communications in general, not just safety messages. Comments elicited by a small, but not trifling, number of respondents are "The company buys my time only when I work." "When I am away from the plant my time is my own." "I never open company mail sent to my home because I would be working on my own time." In such situations an employer may feel it is improper to appear to be imposing his ideas on employees, even when their general well-being is the reason. He then is limited to conducting his off-the-job safety activity during working hours. This is probably where the majority of industrial nonoccupational safety stimulation is centered and it raises a correlative question of some significance, "To what degree does off-the-job safety enhance or dilute the on-the-job safety effort with relation to time, cost, and effectiveness?"

These questions, until answered convincingly, will affect the decisions of employers who are uncertain, at present, whether to expand their attack on off-the-job accidents or to embark on a major program in the first place.

Perhaps an immediate answer to the problem of how to implement off-the-job safety would be to suggest strong community safety programming. At least this would have the advantage of neutralizing many of the questions associated with the employer's engaging in a concentrated attack on the situation. There would still be the matter

of the absence of appropriate performance measures, but at least a general safety climate would be created and possibly some of the controls so advantageously inherent in work situations might be integrated into a community's organized thrust for safety improvement. To weigh the merits of a community attack, consider the elements of the necessary planning.

Element Number One: Make off-the-job safety a total community responsibility. We know that the nonoccupational accident totals have remained disturbingly high in spite of the selfless efforts of a relatively few public-spirited people. But have we considered the possibility that this unfortunate experience may be the result of a "Let George do it" attitude, which we have done little to change? Communicating safety admonitions may improve the behavior of some to a degree, but we probably have maximized already the potential results to be expected from this approach. The few busy professionals and volunteers who have tried to create a stronger climate of "safety awareness" may be overworking the possibility that scanty community participation in the drive for off-the-job safety may be the result of a misdirection of their efforts. People are most apt to take an active part in whatever they have an equity. To many it must seem that the responsibility for nonoccupational safety achievement rests with the few who have assumed it; the others have not been persuaded to make an investment in the campaign for accomplishment. One of the many possibilities for fostering off-the-job safety is to make the people investors in it.

Element Number Two: Organize the community safety effort. Industrial safety has the advantage of having developed from established, relatively sound business organizations. This doubtless is a reason for its relative success. An enterprise, if it is to stay in business, must be systematized and its safety activity, of course, will be disciplined by the business organization's needs and will be integrated into its system. In community activities, however, there is not a similar competitive urgency to build and maintain the most effective organization. The problem then becomes one of making the community safety organization an organism with its parts so integrated that, though they may be separate in interest, their effect upon each other is governed by their relation to the whole of the community's safety needs. Such a unit cannot be hastily composed or casually led. In some respects it is the most challenging of organizational pursuits in which one can engage. It must encourage and provide for sustained investment, to some degree, in the off-the-job safety drive by as many in the community as possible, at all social and business levels.

Element Number Three: Stiffen the enforcement of safety laws and regulations. Although regulation of behavior is distasteful, we should recognize that Government's authority must be invoked when private citizens fail to meet their responsibilities to each other. Safety laws and regulations, by and large, reflect such past failures. We all are required, as good citizen members of the community, to do what is right and thereby limit the need for governmental intervention. But where government has been given the legal authority to act in behalf of the community's safety, it should act to the limit of its authority and the community must see that Government's ability to take the necessary steps is implemented where necessary.

Element Number Four: Recognize that there is no easy solution to a difficult problem. Probably, it will be recognized quickly that a community's first consideration is motor vehicle safety and that an initial positive step would be to reduce traffic hazards. This requires engineering talent and money. Both may seem out of reach for most communities and they are only a portion of the overall problem. It might seem, therefore, that a sustained, well-rounded, organized community safety drive is too far-reaching to permit attainment. Perhaps it is, but these are the elements of the problem at the community level, it seems.

The plague of nonoccupational accidents so far is unlike any other epidemic assault on the safety of people. At least, at present, it does not seem susceptible—as were historical infestations—to control by specific preventatives. Unquestionably this blight is the result of man's ability to bring to his life many refinements which sometimes are too sophisticated for him to manage. The problem is one that is most peculiar to an advanced civilization. It is a challenge to the social culture which spawns it, since the solution seems to depend on the ability of people to join and attack a threat which may not seem too close at any moment, but which steadily takes its toll among the neighbors around us.

The happy effect of a continually significant reduction in off-the-job accidents probably will not be known until people generally enroll themselves in the program for achievement. To accomplish this enlistment probably is off-the-job safety's principal problem.

SYSTEMS FOR REPORTING OFF-THE-JOB ACCIDENTS

R. E. CHANDLER, *Program Coordinator, General Motors Corp., Detroit, Mich.*

Sometime ago a Detroit newspaper devoted an article to on-the-job safety. It quoted statistics to demonstrate that most employees are safer at work than they would be if they were home in bed. I'm sure all of you have seen similar statistics highlighting this fact, and can, therefore, readily realize why the National Safety Council has off-the-job safety as one of its top targets!

Off-the-job safety is also one of the top targets of many companies throughout the Nation. I need not spell out the reasons for this, because you are well aware of the miseries, the inconveniences, the costs, and the effect of an absence upon efficiency when an employee is injured—be it on or away from the job. I'm sure you also know that a rule of thumb ratio of off- to on-the-job lost-time accidents reported by most companies is greater than 5 to 1, with some firms reporting a ratio three or four times larger.

Where To Start?

Granting that there is agreement as to the need for an off-the-job safety program in your organization (if you do not already have such a program), you may well ask, "Where do we start?" Much has been said and written on this very question, but the viewpoints expressed are not always the same. Some organizations have started by first initiating a reporting procedure to gain a grasp of the nature and size of their off-the-job accident problem. Others have bypassed the reporting stage and directed their safety personnel to take the steps they felt most appropriate to cope with the problem. The idea of first understanding the problem before tackling it appeals to those of us who have recently given this area considerable thought. We believe a short period of accurate reporting is invaluable as a basis for designing and initiating an off-the-job program.

There are a couple of major ways to initiate a reporting system. The first is to study systems currently existing in various organizations and evaluate the applicability of these procedures to your operations; then adopt the system best suited to your needs. If none are apropos, you may try to borrow strengths and special features from the various systems to develop a new and better approach. But to do so may be extremely difficult, because procedures from two or more systems most likely are not sufficiently compatible to fit together.

A second way to start a reporting program is to begin from the ground up and develop your own approach. I would encourage you

to do this, because there is a great need and opportunity for creative administration in this area of collecting and analyzing safety statistics. I cannot predict what your end result would be, but do know that you would be meeting a vital need. I can tell you something about what you would discover if you were to go the other route and were to study some of the systems currently in use.

General Characteristics of Reporting Systems

Most systems tend to be patterned after one of two major approaches:

THE SUPERVISORY APPROACH: The first is the supervisory reporting approach, which basically consists of four distinct steps:

Step 1—An absent employee (either hourly or salaried) calls his immediate supervisor to report the cause for being away from work.

Step 2—The supervisor fills out an absent report describing the cause of absence, along with the employee's name, his department, and other identifying information.

Step 3—The supervisor sends the report to a centralized point for processing (*e.g.*, a Personnel Department), where someone responsible for safety practices is given a copy of the report if the absence is the result of an off-the-job accident.

Step 4—The person who receives the reports then accumulates and reviews them, and may even check their validity before summarizing them in a monthly report.

In the case of multi-plant industrial operations, a fifth step is sometime involved in which plant reports are forwarded to the central office for final compilation.

Now, in this business, there is no perfect reporting system. The supervisory reporting approach, like all others, has its strengths and weaknesses. Here are its basic advantages and limitations.

Advantages

The first advantage is that: This method provides the most complete coverage in terms of the number of cases reported. Theoretically, all cases are reported immediately, none being excluded, regardless of the amount of time away from work.

The second advantage is the fact that: The system is uniform for both salaried and hourly people—a characteristic lacking in the next approach which I will describe.

Limitations

First: The system is greatly dependent upon the accuracy of the employee's statement.

Second: It may introduce additional paperwork if a similar system does not already exist in the organization for keeping a detailed record of all absences.

And last: If a similar method does not already exist for reporting absences in your organization, this approach would require that a new system be established in your operations, along with an explanation of the system to all personnel.

A second pattern that some reporting schemes follow is tied in with a system that is almost certain to exist in your operations—namely, a means for reporting insurance claims.

THE INSURANCE RECORDS APPROACH: Because this scheme is related to insurance records, let's call it the insurance records approach. It consists basically of three steps:

Step 1—Most organizations review sickness and accident records of their personnel each month. When this is done, off-the-job accident claims closed during the month are simply recorded on a separate tally sheet.

Step 2—The information compiled in Step 1 is supplemented with data from life insurance records on any accidental off-the-job death if S & A and life insurance records are maintained separately.

Step 3—The complete information is then sent to the person responsible for safety activities who reviews it and forwards it to the central office in the case of multi-unit operations.

There are three advantages and three disadvantages to this method.

Advantages

The first advantage is the fact that the system is very accurate for the accidents reported, since a signed medical report is usually requires little additional paperwork.

Second, it is basically a reviewing and recording system that requires little additional paperwork.

Third, if adopted in your organization, it is quite likely that no new procedures would need to be introduced or explained. Most of the reporting can be a natural byproduct of reports currently being made in your operations.

Disadvantages

First, the system is not uniform for both hourly and salaried employees. In most companies, there is a waiting period (about seven days in duration) for salaried employees before they submit an accident insurance claim, and no waiting period for hourly employees.

So, off-the-job accidents involving salaried employees in which the disability is less than seven days in duration are not reported.

A second disadvantage is that the small number of off-the-job accidents for which no claim is submitted, or submitted and not accepted, would not be reported.

Third, in going this route you admittedly won't have 100 percent coverage. But you should have close to it with your hourly employees. And by reporting statistics for salaried employees separately, then recognizing the limitations in these data, you will have very representative figures from which to draw valid conclusions as to the nature and extent of off-the-job accidents, provided you do not have an inordinate percentage of salaried personnel.

You can readily see that both of the two general patterns—the supervisory reporting approach and the insurance records approach—which most reporting systems tend to follow have strengths and weaknesses. As far as which is best for your organization, I cannot make a recommendation. You are in a better position to evaluate this than I. There are, however, three suggestions which I can offer for your consideration in getting started with a reporting system.

Three Suggestions To Consider in Initiating a System

First of all, I would suggest that you strive for a system having the following characteristics:

It should yield reasonably complete, valid, and reliable data.

It should involve minimum cost and effort.

It should be readily mechanized for rapid access to data and for effecting statistical analyses.

Secondly, I would hope that you can take steps to assure that your system yields statistics which can be categorized by a breakdown of the major cause according to home, transportation, and other public accidents with sub-categories in each area as recommended by the National Safety Council. Computation of your frequency of accident experience should also be patterned after the National Safety Council's line of reasoning which is as follows:

"Normally, an employee works 8 hours a day, 5 days a week. If 8 hours a day for sleeping are excluded, there remain 8 hours a day or 40 hours during the work week in which the employee is exposed to injury off the job. In addition, he has 2 days each weekend of 16 exposure hours each. These 72 exposure hours per week multiplied by $4\frac{1}{2}$ weeks per month total 312 exposure hours per employee per month. No adjustment need be made for overtime since it will be offset by holidays, vacations, and incidental absences.*

**The Challenge to Management of Off-the-Job Accidents*, 16 pp., National Safety Council.

"The off-the-job frequency rate is therefore computed as follows:

$$\text{OTJ frequency rate} = \frac{\text{Number of OTJ injuries} \times 1,000,000}{312 \times \text{number of employees}}$$

As far as severity is concerned, no specific time charges for off-the-job accidents are made. Instead, actual days lost are recorded. As an example, if an employee loses his entire index finger in an accident at work, 400 days are automatically charged. If a similar accident had happened *away from* work, the employee may be off the job for only 4 or 5 days, which would be the number of days lost reported for the off-the-job injury. Down the line, a time charge system may conceivably be developed for off-the-job accidents. But until it is, you will not be able to do such things as compare your on- and off-the-job experience from a severity standpoint.

The last suggestion I have to offer concerns the amount of time and effort you will have to spend to establish a system for reporting data. I think you can expedite this whole matter by looking for, and tying in with, a system or systems currently operating within your organization which, with little modification, could produce off-the-job data. Systems to consider, typically are designed to collect information about such things as absences, insurance claims, or hospital visits.

If such a system is available, your quest for off-the-job accident data will be off to an auspicious start. And yet a minimum effort will have been involved.

But collecting the data is, of course, only the starting point. What you do with the information, how you use it, is what really counts!

HOW TO GET WHERE WE WANT TO GO

ALAN L. KLING, *Director, Loss Prevention, Olin Mathieson Chemical Corp., New York, N.Y.*

It will probably not be surprising if the period in which we now are living is recorded in future history and economic books as the Astronomical Age. This might be expected from our successful penetration of space, but it could also be due in large part to the familiarity which we have with exceedingly large numbers. The massiveness of today's mathematics is certainly impressive, and we talk freely, sometimes even glibly, in terms of millions, billions, and even trillions. Figures which once would have shocked us, we now accept as commonplace.

This may explain why our accident statistics often seem to have so little impact. When viewed from the billion or million figure level, 91,000, the number of accidental fatalities in 1961, does not seem very

large or significant. However, if we stop to realize that safety must be considered from the standpoint of the individual, as the effect on *one* person, then we have the proper perspective. Compared to the numeral one, the mathematical expression of our accident experience begins to have considerably more meaning. Somehow, a new dimension is added to our statistics, and when we find that 85 percent of these fatalities are caused by accidents which occur at home, in public or on our highways, we have a greater appreciation of the importance of off-the-job safety. The emergence of this relatively new term "off-the-job," and the development of programs which cover employees around the clock does not mean that industry has been totally unaware or unconcerned about the needs for greater safety awareness in the employee's personal life. Today, many companies stress fire prevention in the home, traffic safety, spring clean-up week, safe vacations and holiday hazards with posters, pamphlets, or plant publications as part of its regular safety program. Why, then, has there been some reluctance to broaden off-the-job safety activities and make them more effective?

Three O-T-J Safety Myths

There are three principal reasons which plant managers and safety supervisors give to explain their lack of off-the-job safety activities. None of them has any validity.

1. *Encroachment of Personal Rights*—Experience has proven conclusively that employees welcome an interest in their personal safety and that of their families. Those companies which have broad, comprehensive off-the-job safety programs have found no resentment or any indication that private lives were being invaded or personal rights violated. Employee response almost always has been favorable, and if there is any reaction it is one of appreciation.

2. *On-The-Job Safety Has First Priority*—If safety is in large part a matter of attitude, as it is generally now agreed, then it is not possible to draw a line at the plant gate or office door. A person's work habits, his actions and reactions, are not governed by the starting whistle or the timeclock. They become a part of him regardless of whether he is at home or at work. Time and effort spent on off-the-job safety not only contributes to an on-the-job safety program but also is an integral and inseparable part of it.

3. *Can't Start Until I Have a Program*—Too frequently we attempt to excuse inactivity because there has not been developed a formalized program, approved by management and announced with loud fanfare. An off-the-job safety program can begin with a poster placed on a plant bulletin board or vacation booklets inserted in pay check envelopes. A program is in effect and beginning to pay divi-

dends for plant and personnel as soon as there is mention of accident possibilities away from work and we start keeping simple off-the-job injury statistics. The best thing about an off-the-job safety program is that it can start right now and its size—big or little—can be governed entirely by individual plant needs.

The methods used and the means of communication can be divided into two groups. In the first, efforts are directed primarily at the employee; in the second, activities and information are channeled through community organizations with which the employee and his family are associated.

Direct Contact

There are many ways in which information can be imparted to an employee and, through him, to his family. Most of these already exist and can be used effectively with little or no added expense and only slight effort.

Safety Meetings—Most plants have established safety committees which meet regularly. Off-the-job safety topics can be included on the agenda. Interest and enthusiasm is generally increased and there is greater participation in the discussion. A person is usually responsive to his individual hobbies and there are many audio-visual presentations available on accident prevention in these areas. Much of the specific safety instruction given for plant jobs applies equally well for work at home. This is true of lifting, care of tools, the use of ladders, eye protection, fire prevention, and first aid.

Plant Publications—Accident prevention can be personalized in company magazines or newspapers. When these are mailed directly to the home, the employee's family has personal contact with the safety program. In many companies this channel of communication is so effective that the on-the-job safety record of a plant is a matter of concern for the entire family and something in which they share a great deal of pride when the accident experience has been exceptionally good.

Family Programs—At company picnics or when a plant has an "Open House," safety should be stressed. This is an excellent time to demonstrate what the company does to prevent accidents and safeguard employees. Home and highway safety should be given consideration in all activities of this kind.

Bulletin Boards—Not only during "Open House" but throughout the year, off-the-job safety material should be posted on plant bulletin boards. Many types are available from safety councils, insurance companies, and trade associations. They are relatively inexpensive, often supplied without charge, and they are designed by experts to attract attention. This kind of promotional material serves as a strong

reminder to work safely on the job even though the message itself may pertain to an activity far outside the plant gates.

Equipment Loan—Some jobs at home require safety equipment which an employee would not normally own and which would be too expensive for him to buy. A number of companies have found it desirable and worthwhile to have an "equipment loan service" where employees can borrow tools or protective devices which will make a job at home safer. The expense involved is usually insignificant. The amount of employee goodwill which results can be substantial.

Contests and Awards—Where there is a close relationship between plant and community, various types of contests directed at the home can be used with considerable success. Generally, these are not so effective when plants are located in large cities or where the plant population is widely scattered geographically. Contests of this type must be handled with great care because disagreement and ill will can so easily occur, especially among those who do not win. For plant safety performance an award or token of recognition is frequently given to each employee. If this is an item which has use in the home, such as a fire extinguisher or an automobile seat belt, it carries a safety message of its own.

Direct Mail—Letters to the home have high reader response. This is a normal method of communication for many companies. Experience has shown good reception for off-the-job safety information distributed in this manner. Safety reminders inserted in paycheck envelopes will generally reach home.

These are a few of the many ways in which the concept of total safety can be developed by working more or less directly with the employee. But there is another means by which we can greatly enhance an understanding of accident prevention off-the-job. It is in the area where information reaches the employee and his family in a somewhat roundabout way.

Indirect Approach

There are many organizations, community service groups, and public departments with which everyone has more or less contact. Almost all of these can be a channel of communication in an all-out off-the-job safety effort.

Schools—Parents are interested in the activities of their children. They will examine art work, read essays, and cooperate on special projects. Many schools welcome the interest of industry in the field of safety and are willing and eager to develop joint accident prevention programs. In the lower grades, posters are popular and there seems to be an unending supply of finger paint. Upper grades seem to

specialize on essays, and the age of teens is the time for projects. A few cash prizes and a panel of judges, including some company employees, help to create interest and enthusiasm. This is an excellent way to put some life and sparkle into off-the-job safety. You can call it a "PEP Program"—"P" for Posters, "E" for Essays, and "P" for Projects.

In the field of school athletics, plant safety and medical departments can be helpful. At one Olin plant in North Carolina, the company doctor not only attends every high school football game, but also checks in at practice almost every day. Needless to say, employees who are parents of squad members appreciate this kind of personal interest and attention.

Parent Groups—Most towns now have a citizen education committee and almost without exception every school in the country has a parent-teacher organization. These groups have a very keen and active interest in safety and need the help of trained safety supervisors. Frequently, employees who have served on plant safety committees can spearhead accident prevention programs, such as bicycle rodeos, in parent groups.

Service Clubs—Kiwanis, Rotary, Lions, and Exchange Clubs frequently sponsor safety activities. "White Canes for the Blind," a project of The Rotarians, is certainly a fine example of accident prevention.

Junior Baseball—Anyone who has been associated with the Little League or the "Babe Ruth" teams knows the emphasis which is placed on safety and the never-ceasing efforts that is expended to prevent even minor injuries. Many plants have junior baseball coaches and their dedication to youth and safe sports makes them better employees.

Scouting—Plant personnel frequently take an active part in Boy Scout and Girl Scout work. Tomorrow's best citizens are probably learning the principles of democracy and brotherhood in scout troops today. Merit Badge counselors in safety, public health, and fire prevention are needed and many employees, with an assist from a plant safety supervisor, would qualify.

Religious Organizations—There are no interdenominational differences in the field of safety. Ministers, priests, and rabbis have dedicated their lives to the welfare of man. They know from intimate personal experience with the injured and bereaved the fearful impact of serious accidents. Reference to today's terrible traffic toll and the need for common sense driving is not uncommon during a Sunday sermon. I must admit that we still have sin with us even though it has been given treatment by the pulpit for a considerable length of

time. Nevertheless, I think this attention by members of the clergy is very helpful.

Women's Clubs—There is considerable truth in the advice "Never underestimate the power of a woman." Recently, organized women's clubs have been voicing their concern over the mounting accident rate and they have begun to take action. The support being given to automobile seat belts will be of considerable help in making their acceptance and use universal. Plant safety programs, especially that part pertaining to off-the-job safety, can extend to the distaff side of the community and thus become a part of the home life. Any safety supervisor who has an opportunity to speak to a women's club should never miss the opportunity. In addition to fine refreshments, he will have some attentive and receptive ears and his safety message will not go unheeded.

Fire Departments—"Fire Prevention Week" deserves special recognition. In the United States, about 5,500 persons—more than 41 per cent of them children—are killed each year in fires which destroy our homes. Local fire departments, many of them volunteer units manned at least in part by plant employees, welcome the cooperation of local industries and together they can make "Fire Prevention Week" the springboard for a full year's program of fire safety. The National Fire Protection Association has all of the material that is needed to wage an all-out war on fire hazards.

There are many other civic organizations which have or would be willing to include safety in their programs. Local newspapers have shown interest in safety and, of course, where there is a municipal safety council it can spearhead and coordinate accident prevention efforts.

Summary

Statistics and personal experience clearly indicate the need for greater emphasis on off-the-job safety. This is an activity which employees welcome and in which they will willingly cooperate. Off-the-job safety can be an integral and valuable part of the regular on-the-job accident prevention program. The channels of communication, the means by which information is distributed to point of use, can be either directly through the employee or by means of community groups with which he or his family is associated. Off-the-job safety programs will pay dividends to industry. They will reduce accidents and absenteeism. They will improve the relationship with employees and promote better cooperation between labor and management. Truly, this is a "bread upon the water" endeavor for which the return is greater than the time or effort which we expend.

OFF-THE-JOB SAFETY

HARRY H. BRAINERD, *Executive Manager, Western Pennsylvania Safety Council*

It is a privilege to participate in this program, particularly since my part is to discuss a Community Safety Program, an activity in which I am intensely interested. This interest, like many of yours, has stemmed from the experience of working originally with problems of on-the-job safety programs.

Community safety has now become so important to me that I believe we should start to eliminate the use of the words "on-the-job" and "off-the-job." We should begin to think in terms of the "*whole job of safety*" and through the use of language that does not infer there is a difference or condition in which safety is not a factor. In the words of R. W. Graham, immediate past president of the Western Pennsylvania Safety Council, "Total elimination of industrial accidents can be attained only by a total safety effort. This means we must work at safety 24 hours a day. This means that off-the-job safety is most important."

In approaching a discussion of my part in the theme of this session—Safeguarding Human Worth Off the Job—I cannot begin without referring to my experiences as executive manager of the Western Pennsylvania Safety Council. Please bear with me, for we believe these experiences to be typical of an effective community safety program.

The Council was incorporated in 1923 as an organization devoted to the prevention of accidents whether they occurred at work, at home, or at play. It was financed—and still is—by business and industry on a dues-paying basis. In the beginning it was only natural that the emphasis of endeavor would be in the area of occupational accident prevention. However, in those early days away-from-work safety was not completely ignored. As we look back we see that at the start we gave "lip service" to off-the-job or community activities.

This seemed to be the case up to and including the war years, when the emphasis began to change. This change became apparent immediately following the war. The traffic problem grew so fast that it affected the communities and in doing so had an impact both on business and industry. The industrial plants were confronted with the need for increased parking facilities and roads over which their employees had to travel. Retail businesses had similar problems as the movement of traffic became congested. In addition, traffic began to take its toll in death and injury among workers and it became apparent that employers were being affected economically as a result.

At this point the leadership in our Council realized that the Council offered a facility through which traffic safety could be promoted. It also realized that the Council was in a position to stimulate and promote greater effort by officials and citizens in the area of safety on the highways. The traffic safety program has to be all-encompassing, so we participated in established traffic programs, originated and created some new activities, all designed to control traffic accidents.

Another area is that dealing with youth. Our industrial and business people realized that we could be of assistance through the vocational schools. Consequently we began to work cooperatively with the schools in providing more safety information and assistance through the use of our film library, school visitation by safety directors, etc. This work expanded until we became involved with other types of school activities having an emphasis in the traffic and fire prevention areas. With these examples of the expansion or change of emphasis of programing, we now find ourselves with a program that is all-encompassing.

As these programs expanded, our organization needed increased financial support to conduct these varied activities. There was no hesitation on the part of business and industry. They increased their rate of dues and secured additional members to endeavor to keep apace with this expansion. An indication of this is found in a quick look at the budgets. In 1942 our organization had a budget of \$15,000. In 1961 our Council spent \$60,000 in round figures. Over the years this financial growth came from business and industry. I mention this only because it is indicative of the growing sense of responsibility on the part of business and industry toward community off-the-job safety. I hasten to add that over the years the occupational service program of our organization did not diminish but in fact expanded.

A quick summary of some of the activities, it seems to me, would be appropriate. There are the National Safety Council's Inventory of Traffic Safety Activities and the National Safety Council's Home Safety Inventory, fire prevention programs, school safety patrol training camp, power boating and related water sports, driver education, school bus drivers clinics, hunting and careful handling of firearms, to mention a few. Our off-the-job program encompasses all of these and several other programs.

These activities were not selected at random but developed as a result of a direct interest of the business community finding that deaths and injuries resulting from accidents in these areas have an impact on their operations. It is their employees who are involved in these accidents with resulting economic loss to company operations.

The leadership and committee work necessary to make these pro-

grams effective have to be done by people—interested people in these various areas. In our case, it is interesting to note that the people who direct the programing of these activities come to us from the companies supporting the Council, together with public officials and representatives of various civic organizations—a cross section of the people in the community.

The committee dealing with traffic is composed of members of the Telephone Pioneers. These are men and women with 20 or more years service in the telephone industry. The Home Safety Inventory Committee is composed of representatives of the American Society of Safety Engineers, most all of whom are in safety work in industrial plants. The School Safety Patrol Training Camp Committee is composed of school personnel, police officials, automobile club representatives and business leaders. Fire chiefs, volunteer firemen, business leaders, etc., are on the Fire Prevention Committee and in boating and water sports we find the Red Cross, Corps of Engineers, U.S. Coast Guard, the Coast Guard Auxiliary, and business leaders with an interest in boating and water sports as committee members.

To support these specific activities and simultaneously build public awareness of safety, we created a speakers bureau. Its members were recruited from the members of the Council and from the community. There were 81 volunteers cutting across all levels of employment, including company presidents and vice presidents, industrial relations officials, medical men, foremen, and hourly employees. These volunteers were screened and selected for their speaking ability. The Council prepared for them a speech outline and a kit of reference material. Two seminars were held for the purpose of discussing the best ways to present our subject and to develop a theme. The theme decided upon was "Operation Lifesaver." Under this topic our group could discuss traffic, fire prevention, boating, school safety, etc. The need for this service to the community is shown by requests which have resulted in a presentation on an average of once every 3 days, exclusive of summer months.

What have been the results? We believe they have been good. We also believe there is much more to be done. However, we do know that the businesses and industry in our area have continued to have lower frequency and severity on the job. We know that over the years there has been a continuous downward trend in traffic deaths and injuries. We know there has not been an apparent increase in home accidents—it has stayed somewhat static. We do know that accidents to children—both preschool and school age—are decreasing.

A recent survey in the foundry industry in our area shows that off-the-job accidents decreased approximately 37 percent during the

years 1959 through 1961. Similar trends are beginning to show in other industries as they accumulate statistical information. This gives us encouragement, for we know that a coordinated effort such as the one we are building in Western Pennsylvania will pay off. We know the techniques that have been used to lower and control on-the-job accidents can be used and applied to community or off-the-job safety. We also have learned that it takes teamwork—this is the role in which we in a safety council can best provide.

In summary then:

We have found that the reduction of accidents has to be the result of the effort of people. It makes no difference what position in life they hold. It has to be a united effort both on and off the job. The same people interested in boating will be found in a steel plant, an aluminum plant, or a retail store as employees. It is the same people who drive cars that work in these establishments. We firmly believe that continued improvement in on-the-job safety must be supported by off-the-job safety and vice versa.

I would be remiss if I did not mention another point. Many of you come from areas where there are established safety councils. If the council has been certified by the National Safety Council, it must have activities and programs similar to those I have outlined. If your area has no organized safety council or one which is not certified by the National Safety Council, I urge you to return and do what you can to establish, improve, and then support an active, competent local safety council.

WHAT LABOR IS DOING TO SAFEGUARD HUMAN WORTH OFF THE JOB

P. L. SIEMILLER, *General Vice President, International Association of Machinists, Chicago, Ill.*

As a union participant in this National Conference on Safety, it is appropriate that I report mainly on labor's national activities. And since this particular session is concerned with off-the-job safety, I will confine my remarks to the role of the unions in this field.

Before I tell you what we have been doing, I shall tell you briefly why we of organized labor are interested in accident prevention. In simplest terms, it is because the welfare of human beings is our business.

We are interested in safety because we consider it our duty and responsibility as good citizens to be so interested. We are not only union members and employees—we are also good citizens. Our interest in

accident prevention is practically as broad as the whole area of human activity in which accidents occur. We believe that safety is not divisible, that the prevention of accidents everywhere—on the streets and highways, in the homes, in the schools, and in the air, as well as at the workplace—is an interrelated job. In teaching and promoting safety we can't stop at the factory gate.

We of labor are also concerned with accident prevention everywhere because our members and their families are everywhere. They are involved in accidents on the streets and highways as well as at the workplace. I have read that an estimated 60 percent of the persons killed and injured in traffic accidents are employees in industry. Those are our people.

Labor's interest in off-the-job safety has been frequently declared in official statements. As an example, the AFL-CIO at its convention in Atlantic City in 1957, unanimously adopted a resolution on Safety and Industrial Health which stated in part, "We are vitally interested in the safety of our members, on and off the job, their families, and of all citizens of the community and of the Nation."

There are three principal approaches which labor can and does use to promote safety. These are through: (1) labor-management relations; (2) education and training; and (3) legislation at national, State, and local levels.

Where unions and management work together for safety, through joint committees, their predominant interest is in making the workplace safe and healthful. It seems fair to assume that in cooperating to make the workplace safe, unions and management are developing positive attitudes toward safety which could easily be extended to off-the-job activities. There are a number of places where such joint committees have expanded their programs to include safety off the job. In Linden, New Jersey, for example, a union-management safety committee spearheaded a community bike-safety campaign. I wish there were much more off-the-job safety promotion through the joint labor-management approach. It may be that here is an area ready for additional pioneering.

While we are eager at all times to cooperate with others who are working for safety, we are also determined to build an active trade union safety movement—a labor safety movement concerned with actively promoting safety for all workers, both union and nonunion, both on and off the job. In carrying out this determination, labor recorded a most significant "first" in safety promotion last year—and provided an outstanding example of follow-through in carrying out approach number two of the three I mentioned, namely, education and training. This "first" was a national institute in safety training

conducted by the AFL-CIO Committee on Safety and Occupational Health and the Bureau of Labor Standards of the U.S. Department of Labor. The institute was held in Washington, D.C., and consisted of four groups of lessons held at 3-month intervals. The trainees were union safety committeemen and officers. The instructors were, for the most part, from the training staff of the Labor Department's Bureau of Labor Standards.

The first series of classes was devoted to organizing and operating practical safety programs. The second featured instructions in mechanical and physical safety, the third covered chemical and environmental safety, and the fourth was an instructor's institute. Each series ran for 1 week.

A basic purpose of the institute was to train union members who, in turn, will train others. State and city labor central bodies and local unions are being encouraged to hold similar institutes at State and regional levels.

Each class was limited to 25 students, who came from places as widely separated as Connecticut and California, providing a broad cross-section of union representation. They were sent by such organizations as the Auto Workers; Air Line Pilots; Communication Workers; Carpenters; Fire Fighters; Oil, Chemical and Atomic Workers; Seafarers; Operating Engineers; Rubber Workers; Government Employees; and the city central bodies of Los Angeles and Chicago.

The most recent session of the institute closed a month ago, graduating 48 trainees. New classes for the second year will start April 2.

Another union activity which was educational, but in the manner of a publicity-advertising promotion, was begun on March 16, 1 year ago, when the union members of the National Safety Council launched a special campaign to encourage all car owners to install and use seat belts. Trade unionists were urged to do these six things:

Install and use seat belts in their own cars.

Personally recommend them to other union members and friends.

Publicize the value of seat belts in their union papers.

Give a talk on the value of seat belts at a union meeting.

Propose, if their employers hold safety meetings, that a meeting or part of one be devoted to a discussion of seat belts.

Arrange for showing a film on seat belts.

The labor press joined in the seat belt campaign, publicizing in articles, pictures, and editorials, the value of this safety device. The *AFL-CIO News*, official newspaper of the national federation, gave prominent space to an editorial supporting the use of seat belts. It quoted Lloyd Utter, vice president for labor of the National Safety Council and Safety Director of the Auto Workers, as follows: "I

urge all union members to equip their cars with safety belts. . . . Last year 5,000 men, women, and children, many of them members of union families, would not have died in traffic accidents if they had been using a seat belt." Then, as a good example of practicing what you preach, the United Steelworkers of America installed seat belts in the cars of all staff members of the union. This was another "first"—the first time that an international union took action to require seat belts as standard equipment on its staff car fleet.

The crusade for seat belts is like nearly all other human crusades in that it is long and continuing. Many of us in labor have been advocating the use of seat belts for a number of years. I remember, in 1958, that union officials taking part in a series of traffic safety conferences sponsored by the President's Committee for Traffic Safety talked about seat belts and urged that they be made standard equipment in cars. The crusade is getting stronger—and getting results. Last year bills were introduced in several State legislatures to make seat belts mandatory by law. In Wisconsin, a bill became law which requires front-seat safety belts on all 1962 model cars. The bill was supported by labor.

The most outstanding example of off-the-job safety promotion by labor has been the all-union Labor Day safety campaign. This campaign has been waged for 3 successive years, with most gratifying results. The 1961 Labor Day weekend was the safest one on record and marked the third year that deaths were successively lowered over previous years. This achievement is also remarkable in view of the fact that accidental deaths reached an all-time high over the Fourth of July and Memorial Day holidays last year. I am sure that the concerted efforts of organized labor contributed significantly to the good results in the Labor Day campaign.

The genesis of the Labor Day safety campaign was the realization that Labor Day, which was established as a national holiday to honor the workers of our Nation, had become desecrated by the mounting toll of deaths and suffering caused by accidents occurring at that time. It was appropriate, therefore, that organized labor should undertake a national campaign to make this day a safe one for workers and their families, to make this holiday one of fun and joy instead of tragedy and sorrow.

The Labor Day safety campaign was sponsored by all segments of the labor movement. Cosponsors included the AFL-CIO Standing Committee on Safety and Occupational Health, the Labor Conference of the National Safety Council, the United Mine Workers of America, and the Women's Auxiliaries of the AFL-CIO. C. J. Haggerty, President of the Building and Construction Trades Department of the AFL-CIO, was chairman of the Steering Committee for the 1961

campaign. I had the honor of being chairman of the same group in the first campaign in 1959.

I don't know that there were any innovations in the techniques used in the Labor Day campaign. What was new was the amount of work that went into it—the amount of cooperative effort. The campaign was planned long ahead, the first tangible results of which appeared in the labor press early in July. These were articles, messages, pictures, and cartoons. Union officials at all levels, from international to local unions, gave hundreds of safety talks at plant and union meetings and Labor Day celebrations. They spoke on radio and television. Safety floats were built and shown in parades. Posters and displays were put up in plants and union halls. Safety films were shown. Union members asked their pastors to speak for safe driving, working and playing over the Labor Day holiday. Those were the activities which, added together, saved lives last Labor Day.

In addition, labor has been concerning itself with other off-the-job safety activities. Labor has actively cooperated for the last couple of years with the National Safety Council's Christmas holiday safety campaigns. The Labor Conference of the Safety Council has gone on record supporting driver education in schools. Training courses for union safety men, sponsored by the Labor Conference, have been expanded to include off-the-job safety. The Conference also adopted a proposal to expand its off-the-job safety program to include activities on winter driving hazards, the prevention of falls, poisonings, and fires in the homes of workers.

A word about our legislative efforts. I have no intention of attempting to list the measures for which labor continues to press. Many are related to on-the-job safety—in air transport, atomic energy, longshore and harbor work, ship repair, to mention just a few. As an illustration of our interest in off-the-job safety, we testified before congressional committees in support of legislation to require warning and informative labeling of hazardous substances intended for household use. As you know, such an act was passed by Congress. We want it extended to industrial and commercial establishments.

At the outset I said I would report mainly on labor's national activities. Even within this scope, I have not told you everything. I might have mentioned that the labor press joined in the National Safety Council's campaign of publicizing the dangers of plastic film. I might have elaborated on cases of local union off-the-job safety promotions—on how the central labor body took the initiative in organizing a city-wide safety council in Aurora, Ill., and on how a steelworkers local in East Chicago cooperated with the fire department in promoting a fire-safety campaign. But I think I've made the point that we of the unions are actively concerned with off-the-job safety. I know that this concern will be both intensified and broadened in the future.

WORKSHOP: SAFEGUARDING HUMAN WORTH THROUGH MEDICO-ADMINISTRATIVE SKILLS

Moderator: R. LOMAX WELLS, M.D., Medical Director, The Chesapeake & Potomac Telephone Companies, Washington, D.C.

DR. WELLS. It is with a deep sense of humility and personal loss that I act as your moderator today. The untimely death on January 31 of Dr. Adolph Kammer has been a great loss to all of us privileged to know him as a friend and a wise counselor. I beg your indulgence, for the task of preparing these remarks has been made difficult, not so much because of the short time left to step into the breach, but because we have lost one whom we know would have made a sound and enduring contribution to this Conference.

Our panel today is charged with the responsibility of defining the use of medico-administrative skills in safeguarding human worth. For a few moments I would like to set the background for the panelists' discussion.

We do not know exactly when the safety movement began in this country, but we do know that the health professions have been contributing to the prevention of industrial accidents since the English Factory Acts of 1832. It is known, too, that over 150 years ago powder manufacturers constructed their buildings with heavy masonry walls on three sides and the fourth wall of light frame facing a stream or open area to direct the effect of any explosion away from other buildings and personnel. The Association of Iron and Steel Electrical Engineers held the first "Cooperative Safety Conference" at Milwaukee in 1912. The National Council for Industrial Safety was formed in 1913 and became The National Safety Council in 1914. In 1953 the U.S. Government awarded the Council a charter such as that granted to the American National Red Cross. This charter was granted in recognition of 40 years of dedicated service in the field of safety.

The President's Conference on Occupational Safety has been making an increasingly major contribution to our knowledge in this area since its inception in 1948.

"In the large modern plant," as Dr. John Foulger,¹ Director of Medical Research for E. I. duPont de Nemours & Co., pointed out to

¹ *The Health of People Who Work*, Published by The National Health Council. 1960.



Dr. R. Lomax Wells, Moderator, Addresses the Workshop on Medico-Administrative Skills.

the National Health Forum (1959), "the provision of a safe working environment is a joint responsibility of many elements of management. The designing engineer must plan a safe plant," he explained. "The safety engineer and his operating crew must maintain the plant in good condition for safe operation. The ventilating engineer and the industrial hygienist must keep atmospheric contamination to a minimum, reduce noise to a safe level and control lighting in the interest of safety. In many modern plants the health physicist must reduce or eliminate the possibilities of injury from radiation." Speaking of the doctors' and nurses' role, Dr. Foulger pointed out that they must be "competent to treat casualties that result from failures in safety engineering and industrial hygiene," but he went on to stress that their more important job "is *preventive* rather than diagnosis." The industrial medical personnel has a unique opportunity to identify areas of industrial hazard resulting in disease and injury and has the responsibility to inform management of the areas and to assist by suggesting changes that will prevent disease and injury. I do not think I am wrong in saying that wise and well-informed management will, without exception, lean on its medical advisors for counsel and guidance in these areas. Physicians and nurses must maintain an active interest in possible causes and sources of industrial and non-industrial accidents and should make regular plant inspections designed to study the working conditions of the plant's employees.

Leavell and Clark² point out that "the approach to accident prevention is based on *engineering* to eliminate structural and mechanical causes of accidents, *education* to minimize the human factor, and *enforcement* to see that laws designed to reduce accidents are carried out."

Hilleboe and Larimore³ have made the point that the epidemiologic approach to the accident problem holds out real promise. They state: "The accident syndrome may be dissected into virtually the same components as any disease agent: agent, host, and environment. In the epidemiologic approach, accidents are first grouped by causation and then studied as to the factors associated with the victim or host, the agent which produced the accident, and finally the circumstances in the environment which contributed to it. . . . This approach enables the investigator to bring into sharp focus the relevant etiologic factors and separate them from the nonessential factors." The major environmental groupings are well known, *i.e.*, motor vehicles, home, public places, and on the job (*industrial and farm*). The motor ve-

² *Preventive Medicine For The Doctor and His Community*, Leavell and Clark. McGraw-Hill Book Co., Inc. 1958.

³ *Preventive Medicine*, Hilleboe and Larimore. W. B. Saunders Company. 1959.

hicle is the major cause of death and injury; home is the next greatest killer, followed by work accidents and then public accident deaths.

This afternoon these precepts and tenets will be discussed from the point of view of the physician and nurse in industry and government, defining the broad general problems as well as current, active experiences in accident prevention. Their remarks will be reinforced by an industrial hygienist and health physicist, who will speak in terms of industrial health, radiation health, and human engineering. I anticipate that they will not only be informative in their discussions, but challenging as well. I hope these discussions will precipitate a lively question-and-answer period with full audience participation.

My original role in this workshop was that of panelist. Now, however, I must assume a dual role and I hope you will bear with me when I later make my remarks as a panel member.

Text of Dr. Wells' Panel Presentation

The role of the physician in safety programs (both on-duty and off-duty) varies among industries from a relatively passive to a very active role. The attitude of management and that of the physician himself determines what the role will be. Many groups and agencies devote some or all of their energies in the field of accident prevention. Much is known now and the premise for the first part of this discussion is simply that much can be achieved in solving *present-day problems* by an intensive application of what we know today:

I. Industry

1. *Employer Programs*

Constant attention to—

- (a) *Preplacement examinations*—correction of impairments before employment.
- (b) *Proper placement*; limitations, if any, clearly defined for supervision. This includes, of course, the employment and appropriate placement of the physically handicapped.
- (c) Continuous and intensive training in job methods and safety practices.
- (d) Provisions of the industrial safety laws.
- (e) Periodic health evaluations with appropriate orientation in health factors which can cause accidents:
 - (1) Heart disease—sudden cerebral hemorrhage or coronary occlusion.
 - (2) Debilitating diseases such as anemia, leukemia, cancer, cirrhosis, etc., causing weakness and loss of physical stamina.

- (3) Diseases causing loss of normal motions such as arthritis and various neurological and muscle diseases.
- (4) Diabetes—coma.
- (5) Ear diseases disturbing hearing or causing dizziness and loss of normal balance.
- (6) Impairments caused by excessive stress such as excessive cold, excessive heat, excessive noise, high altitude, etc.
- (7) The use of certain drugs, such as narcotics, antihistamines, tranquilizers and sedatives or alcohol, anesthetics, and vapors from several solvents which impair judgment and reaction time.
- (8) CVS diseases such as brain tumor, epilepsy, and the frank psychoses.
- (9) The immature and aggressive individual, the poorly motivated, those of poor judgment because of lack of experience or training.
- (f) Supervision alerted and knowledgeable in safety matters with good supervision maintaining high morale and low quit rates.
- (g) Intelligent handling of absences and encouraging the development of mature responsibility of the individual toward his health.

2. *Insurance Carrier Programs*

Improvement should come from increased emphasis on—

- (1) Safety guards.
- (2) Better and safer machinery.
- (3) Improved and intensive programs aimed at increasing the effectiveness of rehabilitation of the injured employee.
- (4) Increasing emphasis in the field of safety education (this should be beamed at all employees, not just those working in areas of identifiable hazards).
- (5) A pooling among carriers of statistical data regarding the causes and control of accidents.

II. **Community Agencies**

- 1. Emphasis on the part of such agencies on safety and utilization of the nurse visiting in the home to think about safety and to teach it.
- 2. There would seem to be little emphasis placed on safety by the personal physician. Perhaps medical societies could stress a safety program among their members rather than sticking purely to

the therapeutic approach. The personal physician could be a potent force in this area if he would embark on a program of stressing safety in his daily practice of medicine.

3. Programs designed to create a better climate between the industrial health personnel, community agency personnel, and the personal physician.

4. School health.

Activities on the part of school health personnel should be directed toward a more intensive program of early detection and correction (where possible) of mental and emotional as well as physical handicaps. Such a program could be strengthened by appropriate vocational guidance if indicated. Such a program would, of necessity, call for more vocational guidance in schools.

Increasing emphasis should be directed at all educational levels to provide or strengthen safety supervision and education.

5. Union health programs.

Where union health programs exist, the directors and staff can make a contribution to the safety program emphasizing the known elements of safety education, the need for and value of early rehabilitation, and assisting with vocational guidance and training.

III. Official Governmental Agencies

Addressing the opening of the 16th Annual Federal Safety Conference in Chicago last October, James J. Reynolds, Assistant Secretary of Labor, proposed six safety measures "embodying what we already know" as a basis for reducing motor vehicle accidents involving Federal employees. His proposals illustrate what can be done in other areas of safety, and at other levels of government—State, county, and city. They bear repeating and are as follows:

- "1. Centralized injury reporting and statistical compilation to support effective accident cause analysis.
- "2. Stepping up State-Armed Services-Federal traffic safety program.
- "3. Full compliance by agencies with the provisions of Chapter M-2 of the Federal Personnel Manual outlining standards of physical fitness and driving competence for Federal motor vehicle drivers.
- "4. Adoption by agencies of safety programs similar to successful programs now in operation in certain Federal units (e.g., the Army's concept of 'total safety').
- "5. Maintenance of all equipment in good operating condition.

"6. Increased participation by Field Councils in projects such as special testing and training programs for Government drivers."

Such a program should be an effective approach to the problem.

Going now to the premise that we can solve a sizable fraction of *future* problems by intensive application of what we now know, efforts should be directed toward:

1. Personal Characteristics of Employees

This is an area in which continuing research goes on and is a responsibility of the personnel and medical departments. One real problem is the need for more and improved tests aimed at developing a picture of the prospective employee's emotional profile and his maturity. This involves more intensive screening tests by both departments concerned with the applicant for employment. It involves all levels of supervision and the education and training of supervision to have a better understanding of "what makes the individual tick." Obviously this gets into the problems of people both on and off the job as it relates to their on- and off-duty responsibilities.

Levinson has pointed out that "There is much clinical evidence to indicate that often the reasons for accidents are logical, but the logic is that of the person's unconscious thinking which bears no relationship to what we regard as every-day common sense." He goes on further to say—"By far and large the safety movement has failed to recognize that where accidents are psychologically motivated, the motivation is probably most often unconscious."

The assumption is that in all of us two basic drives exist—the aggressive drive and the constructive drive. It is felt that too much aggressive drive is one cause of accidents. There are many outlets for this aggressive drive. In this connection Levinson further states: "It has often been observed clinically that the aggressive drive lies behind accidents, that the accident becomes a vehicle for turning one's aggressive drive against himself as a self-punishment or against others as a form of revenge."

These remarks point up the fact that safety emphasis should begin with people and not just machines. The safety man must be oriented in this area and it behooves him to learn all he can about psychology and motivation—this does not mean he should attempt to be a "junior grade" psychiatrist or psychologist, but he must be knowledgeable in the field.

The personal characteristics of employees will be known better if the company looks for them through systematic search utilizing intensive screening with tests, interviews, and medical examinations. Through the use of periodic health evaluations along with evaluation

of job performance, attitudes and behavior, the story of the health and job experiences of the employee will better unfold and corrective measures instituted as indicated.

2. Environmental Factors

The continuing study and determination of damaging potentials of the various agents and materials used in the plant is a "must." This calls for, among other things, better conditioning of the individual to enable him to adapt successfully to his surroundings and his job conditions, to wit: heat, cold, noise, monotony, weightlessness.

Such study and determinations call for increasing use of animal experimentation, fundamental biologic studies, case studies and observations and epidemiologic studies of the potentially exposed worker as well and the environmental measurements such as heat, cold, noise, etc.

Thus far we have talked about using what we have and what we know. Problems presenting themselves in the future call for new approaches and the development of new methods of study and new methods of applying what we learn. It is apparent as our in-plant experiences improve that we are concerned less with traumatic episodes and lesser degrees of injury. The rapidly increasing number of new agents presents a challenge, for newer methods of toxicological research must be discovered if the hazards inherent in the agent are to be defined early enough to prevent damage to the user (both the employee and the consumer).

Again, future research must include studies on motivation and maturity leading to new and more effective measures for testing the individual.

Perhaps as we grow we can better come to understand man and the complexities of the biological, physiological, and perhaps immunological, factors that cause him to react in such a way as to cause him to have an accident. At least, man *per se* cannot be neglected in any future studies for he remains our primary problem. How well we succeed in solving our problems will be in direct proportion to how good is the all-round management of the business—without which no program of accident prevention will be very successful.

THE ROLE OF THE OCCUPATIONAL HEALTH NURSE IN SAFETY PROGRAMS

MARY LOUISE BROWN, R.N., *Chief, Occupational Health Nursing Section, Division of Occupational Health, U.S. Public Health Service, Washington, D.C.*

(Miss Brown's paper was read by Mrs. Maybelle J. Marquee, R.N., Division of Occupational Health, U.S. Public Health Service)

Occupational health nursing is the application of nursing and public health procedures to conserve, promote, and restore the health of individuals and groups through their places of employment. Working with physicians, engineers, and allied personnel, the nurse is in a strategic position to help provide occupational health and safety services.

In the safety part of the program, the nurse carries on supportive and independent activities. At times, her role is that of a coordinator or advisor to those who have more direct responsibility. The independent activities she carries on are usually an adjunct to the nursing care that she gives to workers who have occupational or nonoccupational injuries. As time and the readiness of the worker to learn permits, she tries to make safety a way of life and to help the individual carry on his activities at work or at play in a safe manner.

The nurse adapts her educational efforts to meet the demands of the industrial environment. Since workers cannot be away from their jobs for long periods of time, the occupational health nurse makes maximum use of the opportunities for education which arise in the exercise of her professional duties. When removing a loose foreign body from the eye of a worker, she cautions him about the need for protective equipment, or she checks the fit of his goggles. In caring for a worker with a burn on his hand, she notices his soft-toe sandals. She inquires into the lack of safety shoes and, if necessary, alerts the worker's foreman that he is at work without the regulation footwear. During heat therapy prescribed by his private physician, a worker tells the nurse that he plans a fishing trip with his teenage son. As he prepares to leave, she suggests that he stop at the pamphlet rack in the waiting room and take home the booklet on Water Safety.

For the effective occupational health nurse, safety is a way of life. She trains her eyes to see, her ears to hear, and her mind to understand the unsafe condition, the unsafe act, and the unsafe attitude. Every action of the nurse, everything she says or does not say influences the

worker's attitude toward health and safety. By her own example, she demonstrates to others the value she places on doing things the safe way. When in the work area, she proudly wears safety glasses and a hard hat. She communicates her interest in, and her understanding of, what the workers are doing, and she uses the prestige of her position to reinforce the safety directives and educational efforts of the foreman and safety personnel.

In the health department and other key places throughout the plant, the occupational health nurse arranges or helps to arrange bulletin boards, pamphlet racks, and safety exhibits. In smaller establishments where production personnel are responsible for occupational safety, the nurse may have primary responsibility for the safety displays. In large plants, full-time safety personnel frequently have this responsibility. If the nurse, or some representative of the health department, is not involved to some degree, however, the education program and the relationships between personnel of the health and safety departments are less than ideal.

Slogans, posters, or pamphlets alone do not constitute a safety education program. Planned meetings to present the "how" and the "why" of safe methods of working on or off the job and of playing are essential. The nurse has a contribution to make to formal safety education programs. Her understanding of worker needs through her direct contact with those who have had accidents, and those who seek health advice should be utilized in program planning. Her contacts with voluntary and official health agencies should be considered an asset both by herself and by others within the industry. When working on community projects, she can interpret industry's need for adult educational materials, and she can learn of resources that will strengthen in-plant safety education programs.

Safety committee responsibilities are frequently assigned to occupational health nurses in both large and small industries. At times the nurse is an ex-officio member; in some instances, she serves as secretary. The wise chairman assures that she is a participating member who shares with the committee her understanding of human relations, and the health problems of the workers.

The end result of an occupational safety program should be the development of constructive attitudes and actions. People accept new ideas and practices only when they are convinced of their importance, and then only after they have used and become familiar with them. The nurse frequently sees the worker when he is most ready to learn. Her personal interest in him as an individual, when meeting him as a new employee, or when caring for him when he is injured, can help him to accept safety regulations not as rules that

must be obeyed, but as rules designed to *safeguard his human worth*.

Working with others, the occupational health nurse can and does play a part in the occupational safety program. Many factors influence the scope of her activities. The most influential are her own interest and knowledge, and the responsibility that others on the health and safety team expect her to carry. An active role in the safety program makes the role of the occupational health nurse a dynamic and challenging one.

SOME OBSERVATIONS ON SAFEGUARDING HUMAN WORTH THROUGH MEDICO-ADMINISTRATIVE SKILLS

O. M. DERRYBERRY, M.D., *Medical Director, Tennessee Valley Authority,
Chattanooga, Tenn.*

Preparation for a career in the field of medicine requires that knowledge and skill be acquired in a great variety of subject matter areas. However, the art and science of administration is rarely if ever found in the curricula of our medical colleges today. Hence the M.D. degree does not justify us in taking medico-administrative skills for granted. Skill in the administration of the the health sciences can, however, be developed through post-doctoral study or experience. This skill, when added to the physician's basic training in human physiology, provides an ideal focal point for direction and coordination of the work of the several professional disciplines concerned with health and safety of the worker and the relationships thereto of his work environment. Having learned to subjugate his traditionally authoritarian role to the objective of effective teamwork, the physician can help to create an administrative climate which should, indeed, contribute to the safeguarding of human worth.

Before his untimely death, Dr. A. G. Kammer had posed three general propositions to this panel. I should like to comment on these propositions, one at a time.

PROPOSITION I. *Much can be achieved in the solution of present problems by intensive application of what we now know.*

It is well known that the majority of workers in this country are employed in small plants which have little or no organized industrial health and safety services. More intensive application to these workers of what we now know would undoubtedly produce great returns in reduced occupational injury and disease. The unsolved problem is that of finding methodologies which will bring preventive health

and safety services to these small plants. Insurance carriers are doing a good job in many situations, I am sure. Public health departments are meeting the need in some localities, and effective partnership arrangements between several small plants exist here and there.

But these efforts are reaching relatively few of the workers employed in small plants. I am convinced, moreover, that even in the large plants where organized health and safety services are provided, there is significant need to develop better employee understanding of the purpose of service—*viz*, not just for increased production, but also for the purpose of promoting good health and job satisfaction. The problem is not made simpler by the fact that the number of physicians properly trained to develop and administer occupational health and safety programs in industry is far less than the need.

PROPOSITION II. *We probably can solve a sizable fraction of future problems by intensive application of what we now know.*

A key factor in the maintenance and promotion of health and safety is a continued state of compatibility between the physical capacity of the worker and stresses or demands of the job. As workers grow older, there is no doubt that more intensive medico-administrative effort will be required to keep the man-job equation in balance. This means that regular evaluation of worker health will be necessary so as to detect changes which have job-placement implications. It means also a challenging task in personnel administration that will find ways of making adjustments in job assignments acceptable both to management and to the worker.

It seems to me that this changing man-job relationship argues against the establishment of rigid physical-capacity, job-demands standards. Rather, a degree of flexibility in fitting job content to worker health would make the adjustment problem more practical of solution. An organized plan of collaboration between safety engineering skills and medico-administrative skills has long existed in our TVA health and safety service. In placing a craftsman with limited health capacities, safety engineers with their more detailed knowledge of job elements, and industrial physicians with their understanding of human physiology, pool their efforts in refining and monitoring his limitations. This practice applies not only at the time of initial employment but also at the time of periodic reexamination of workers for health guidance purposes.

The rapid and extensive growth in the varieties of materials and compounds used or produced in industry today must certainly be accompanied by an intensification of efforts to establish and maintain safe levels of worker exposure to those which are potentially toxic.

This means not only an expansion of environmental monitoring by known industrial hygiene techniques but also a supplementary expansion of special examination of workers to assure that controls applied are accomplishing their purpose of preventing undue absorption of environmental contaminant. More than ever before there will be a need for effective collaboration between the several skills dedicated to worker health and safety as new materials and man-machine relationships are introduced into industry.

And I have no doubt but that we shall even have to intensify efforts to insure a continuing high priority for hazard correction; for we must, as Wolman¹ has said about sanitation, beware lest success to date in industrial accident and disease prevention bring the penalty of official disinterest. Prior success should not provide the basis for a complacency which would tolerate the carelessness so familiar in earlier days and let it become, like Pope's vice:

. . . a monster of so frightful mien,
As, to be hated, needs to be seen;
But seen too oft, familiar with her face,
We first endure, then pity, then embrace.

PROPOSITION III. *Some future problems can be solved only if we develop new methods through successful research.*

In fiscal year 1961, the work injury experience of TVA developed a frequency rate (5.99) which was only about one-tenth the rate for fiscal year 1935. Experience in TVA has hovered about the 1961 rate since 1949—sometimes a bit higher, sometimes a bit lower. Here is concrete evidence that despite the impressive accident prevention experience of the earlier years of TVA, efforts to drive rates to still lower levels have so far met with varying success. We are convinced that new ways of examining the etiology of accidents need to be developed as a first step in arriving at effective techniques of prevention. The epidemiologic methods used in examining causation and distribution of disease should prove equally rewarding in examining the accident phenomenon. We are, in fact, attempting to develop a procedure for improved collection and analysis of data which would correlate job conditions and human factors having to do with accidents—both those resulting in injury and at least a representative sample of those not associated with personal injury. This will include the use of newly developed methods of machine tabulation and electronic data

¹ Wolman, Abel, Dr. Engr., "Physical Aspects of Environment," Second National Congress on Environmental Health, University of Michigan, Ann Arbor, Michigan, June 6-8, 1961.

processing which have such great potential for extending the depth and scope of epidemiologic investigations.

Similarly, better methods of evaluating the impact of new environmental stresses on worker health and safety must be found so as to quantitate these stresses as accurately as possible for consideration by design engineers as automation and other technological advances produce a different set of man-machine relationships. Hatch² has aptly referred to this as *human factors engineering* which he defines as "the application of the principles, laws and quantitative relationships which govern man's response to external stress to the analysis and design of machines and other engineering structures, so that the operator of such equipment will not be stressed beyond his proper limit or the machine forced to operate at less than its full capacity in order for the operator to stay within acceptable limits of human capabilities." Teamwork of an ever-expanding group of scientific disciplines must be the order of the new day which seeks to bring new dimensions of living but which must not lose sight of the attendant responsibility to *safeguard* human worth—a vigil that is never finished but must always be kept.

COOPERATION BETWEEN THE SAFETY AND MEDICAL DEPARTMENTS

Excerpted from statement of MRS. ANNE J. MURPHY, R.N., Corporate Staff Nurse, Scott Paper Co., Philadelphia, Pa.

Progressive companies—large and small—recognize today that their employees are their most priceless asset.

This attitude has not always prevailed. Not so very long ago many companies provided occupational health services for the sole purpose of complying (on a minimum basis) with compensation laws.

However, the successful business leader of today is genuinely interested in the health, welfare, and morale of the employee. The employee's role, too, has changed. He is more important—more valuable—to the total success of his company.

The day of hiring someone off the street is, for the most part, nonexistent. Modern production methods and complex, high-speed machinery demand that new employees be screened carefully. It has become essential to hire men and women who are suited for a given job—people who can be trained to do that job well—and safely.

² Hatch, Theodore, "Human-Factors Engineering and Safety Research," *Journal of Occupational Medicine*, Vol. 4, No. 1, January 1962.

Thus, the hiring of a new employee is a serious matter. And once the person is employed, we in industrial medicine must bear many other responsibilities. Actually, our job today is more important than ever before, because our companies are interested in *preventive* medicine as well as *curative*.

My company employs about 10,500 men and women in 15 plants located strategically around the country. It manufactures household and industrial paper products; it also produces polyester foam and plastic containers.

The production of these items requires the use of complex machinery and a number of chemicals. For example, the production of paper is accomplished on large paper machines, some of which are longer than a city block and stand two to three stories high.

At Scott Paper Co., the medical department works closely with the safety department. The company has a full-time safety manager at each of its larger plants; in the smaller plants, an individual—perhaps the personnel manager—is given the responsibility for safety. A first aid department, operated by at least one industrial nurse, has been established at most of our plants.

For the next few minutes, I shall cover some of the safety training factors we consider important. Perhaps some of these points will suggest ideas which might work in your company. And by way of conclusion, I shall make some suggestions as to medical services for those of you who represent smaller businesses. Despite the fact that Scott is a large company, our plants are encouraged to operate independently. Therefore, some of our experience is similar to the operation of a smaller company.

The pre-placement physical examination offers an excellent opportunity to teach good safety practices and procedures. During such an exam, the new employee is particularly receptive to ideas and suggestions, and I believe that we should do everything possible to assist him toward developing healthy safety attitudes. The nurse can work closely with members of the safety department by instructing the employee in the proper use of safety equipment, the responsibility he bears both to himself and his fellow employees, and the reporting of accidents, illness, and absenteeism.

Above all, we must make it clear to the new employee that we are genuinely interested in his welfare. In this way, we can encourage him to counsel with us at any time.

Most safety programs can be aided materially by the occupational health department. For example, we can accomplish a great deal with a hearing conservation program where acoustic trauma is a problem. Much has been done to reduce noise in industry, but thousands are

still exposed to harmful noise. However, loss of hearing is, in my opinion, totally unnecessary today because we can supply—and properly fit—ear defenders.

Sight conservation represents another important program. We encourage the use of safety glasses wherever appropriate. And we know that individual job performance can be improved by providing prescription-fitted safety glasses to employees who need them.

Personal cleanliness is yet another program which we should encourage. As you know, personal cleanliness together with the use of protective materials and equipment can reduce—indeed, stamp out—dermatitis.

There are two other important areas where I believe we in the occupational health service can be of significant assistance. First, I am confident that we can achieve substantial safety gains by establishing good rapport with plant supervisors. Second, we must do everything possible to get to know the employees—and to listen to their problems.

Scott management believes that supervisors can make a big contribution to safety by “common sense” understanding. Because the supervisor works closely with employees, he is in the best possible position to learn something of the background of each employee under his charge. It stands to reason, then, that we in the medical department—together with safety department personnel—can be of great service to the supervisor by encouraging him to investigate the motivations and the likes and the dislikes of the employees for whom he is responsible.

Just as the supervisor is encouraged to counsel with the employee we, too, should be ready to listen whenever an employee comes to us with a personal problem. Elation or despondency, coupled with unsafe work habits, can set up an accident situation.

Now—how can we relate this to those of you who represent smaller companies and services? By now I imagine some of you must be saying to yourselves that this kind of operation is fine for a large organization but that these activities can hardly be applied to smaller companies.

I suggest you think in terms of a cooperative plan; many such programs are functioning successfully today. Perhaps your company—and several others of comparable size in your area—can join in establishing a clinical type of operation. You might first investigate in your particular area because it's possible that some sort of effort like this already has been organized.

If companies involved employ a very small number of people, one nurse might be able to minister to several plants. For companies employing a substantial number of men and women, the full-time

services of a nurse are probably required. However, you might consider retaining a physician on a cooperative basis.

Whenever you are seeking a doctor or a nurse, make certain that you are getting an individual who is sincerely interested in industrial medicine. In the long run, this should pay you big dividends.

Arrangements of this kind need not be limited to small manufacturing companies. They can also apply to construction workers, small contractors, and even to agricultural workers. There are clinics in rural areas and farmers have cooperative programs for other purposes.

I am not suggesting for a moment that what I have proposed will be accomplished easily. There are many problems, but overcoming these obstacles would be well worth the effort. If nonmanufacturing groups can be motivated to try such an idea, their record can be improved to compare favorably with manufacturing. Accidents, absenteeism, and training new employees are as costly for you as for large business. I do not believe that you can afford *not* to have a Safety Education and Accident Prevention Program.

SOME OBSERVATIONS ON SAFEGUARDING HUMAN WORTH THROUGH MEDICO-ADMINISTRATIVE SKILLS

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Around the turn of the century the "lucifer" match was a standard household commodity. However, it was legislated out of existence because production workers developed an incurable disease known as "phossy-jaw" from the phosphorus used in its manufacture.

By way of contrast, when it was shown in the 1940's that exposure to beryllium dust was producing scores of deaths from berylliosis, clamor was not to outlaw the use of beryllium but rather to learn the relationship between the agent and the disease and to devise means of control. Providing this know-how to identify the environmental agent, to measure the magnitude of the agent in the environment and to develop adequate control measures is a responsibility of a group of specialists called industrial hygienists.

The assessment and control of the present day's complex industrial environment requires the participation of specialists in engineering, chemistry, physics, physiology, toxicology, psychology, statistics, and medicine. But it was not always so. Starting with the few industrial hygienists recruited during World War I, it was originally the engineer teaming up with the chemist and, of course, the physician, who

tackled the control of environments which gave rise to the industrial diseases which were plaguing a rapidly expanding industrial activity. The most devastating were undertaken first.

There was a time, only 3 or 4 decades ago, when *every person* who had worked in the granite sheds of New England for as long as 10 years contracted silicosis—a shockingly debilitating disease which invariably brought on disability and premature death. Starting with the initial studies in the lead and zinc mines of Oklahoma, Kansas, and Missouri in 1914 and continuing with the epidemiological studies in the granite sheds in the 1920's, the etiologic agent, free silica, was singled out, criteria for safe operation were developed, and control methods devised. It is significant to note that to this very day not a single case of silicosis has been discovered among those workers who started to work in a granite shed after control measures were instituted!

Similarly, lead poisoning was considered the inevitable risk of working in the printing, lead shot, storage battery, lead additive, or paint industries until industrial hygienists sought an understanding of the cause and devised engineering control measures. Today, lead poisoning is rarely found in industry and then only when known control methods are ignored.

The vast expansion of the chemical industries, which began in the late 1930's and continues to the present time, produced new chemicals so rapidly that it was no longer possible to assess their impact on health solely by observing their effects on a working population and thus the experimental toxicologist became an indispensable adjunct to the industrial hygienist. By testing these myriad compounds on laboratory animals and extrapolating generally to man, criteria were set up for the engineering controls.

Advances in legislation for the protection of the industrial workers, particularly the extension of workmen's compensation acts to include compensation for occupational diseases served to increase the demands for solution of additional problems. Industrial noise and its relation to hearing has become the object of intensive study which is still going on. The control of the hot environments in the steel, ceramics, and glass industries demonstrated that heat prostration could be eliminated, accidents reduced, and worker efficiency increased in one fell swoop. And then, during World War II, the nuclear age was born and the problem of living with radiation was undertaken.

Actually, the harmful effects of radiation were confirmed by E. H. Grubbe of Chicago, the same week that Roentgen announced the discovery of X-rays in January 1896. Additional evidence was accumulated as a result of the experiences of the early radium dial painters.

Despite this early knowledge, the graduation from the 2-pound-radium age to the thousand-ton-radium equivalent age gave birth, at the University of Chicago in the summer of 1942, to a new specialty in the field of health protection—health physics. (A name rather pragmatically given to the *Physics* Section of the *Health* Division of the Wartime Plutonium Project.)

Although contending with the shroud of secrecy and somewhat divorced from the tradition of public health, this group and its successors laid a firm scientific foundation for workable solutions to many complex problems essential to the protection of industrial workers from ionizing radiations. For example:

1. Calculation of shielding requirements for protection from broad beams of gamma and neutron radiation.
2. Development and continuing improvement of techniques for measuring and characterizing radiation exposures.
3. Promulgation of threshold limit values for the various kinds and energies of radiation.
4. Devising of techniques for disposing of the inevitable radioactive wastes which result from the utilization of nuclear energy.
5. Designing casks and containers for the safe storage and transportation of radioactive materials.
6. Derivation of mathematical relationships governing criticality of fissionable materials under a wide range of conditions.
7. Reduction of this mass of technical data to operational procedures for use in industry.

Has the health physicist been successful in teaching the atomic energy worker to work safely?

Well, there are about 120,000 people working in AEC-owned production plants, research laboratories, test areas, and reactor facilities.

Of the total of 6,797 lost-time accidents occurring since the beginning of the Atomic Energy Program in 1943 (this includes the Manhattan Project experience) only 35 or 0.6 percent were radiation injuries.

There has been a total of 230 industrial fatalities during this period 1943–61. Six of these were related to radiation; three as a result of overexposure to radiation, and three as a result of the reactor explosion in Idaho last year.

AEC's industrial injury frequency rates have always been much lower than the "all industry" rate reported by the National Safety Council. The annual average frequency rate for 1960 (the latest available) for the NSC was 6.04 compared to 1.71 for the AEC during that same year.

As we look back on the industrial panorama which has unfolded in the past half-century, it is clear that the health problems attendant

upon man's interaction with the industrial environment have changed rather markedly. No longer do we measure our accomplishments by merely noting the reduction in death rate at the end of the year. Indeed, many industrial physicians no longer even see frank cases of occupational diseases during the course of a year or more. Greater emphasis is placed upon initial, nonsymptomatic physiological changes and the chronic and even genetic effects of very low exposures. Paralleling this change in the nature of industrial health problems, has been a pronounced change in the kind of industry—automation has arrived and with it an array of more subtle health and safety problems.

Who could doubt the beneficial economic results accruing from centralized control in automatized industries? But centralized control means more meters and instruments to read and introduces the design problem of how to arrange controls for optimum operator performance. We have the curious situation in which the operator has relatively little to do most of the time (leading to boredom) but during an emergency must do immediately a great many things he has never done before.

Early airplane cockpits contained a total of five instruments (including a clock). In order to enable a pilot to take better advantage of technical improvements, other instruments were added and today the cockpit of a twin-engined airliner contains an array of 85 switches, 50 controls, and 90 indicators. Is it any wonder that numerous disasters have resulted from the pilot confusion in this electronic labyrinth?

These are only two of the many instances where major technological advances have substantially improved man's control over his industrial environment and his status as a worker only to give rise to new stresses of a different kind. The problems solved, in general, have been gross physical ones; the problems created have been more subtle and, as such, require a different approach for solution.

Thus, into the field of health and safety, has come a new approach—the engineering design of workplaces based upon the human capabilities and limitations of the operators. Many studies have shown that the human factor in accident control is of very great significance. Regardless of the degree of training, when an operator of a poorly designed machine is faced with an emergency, he frequently reverts to previous habit patterns or follows an inherent logic of his own in committing an unsafe act. There is certainly a basis for the contention that psychologists and other experts in human behavior will play a greater and greater role in accident prevention.

Summing up, I would like to draw two conclusions:

1. The nature of industrial health problems is changing, first of all because as the more obvious problems are solved, the remaining ones are more subtle and require different approaches; and secondly, because the nature of industrial work itself is changing markedly with the introduction of automation.

2. In view of the substantial technical achievements in the field of industrial health protection, a sizable fraction of future problems can be solved by intensive application of what we now know.

Having stated this platitude, I would like to enumerate some exceptions; problems that I think will require the development of new methods in the future:

1. The number of new chemicals being developed for use in industry and in the home is increasing so rapidly that their hazard to man cannot adequately be defined by present toxicologic research methods. It will be necessary to develop new screening methods and new shortcuts to toxicological research to avoid flooding the country with chemicals of unevaluated toxicity.

2. The unmistakable trend is to be concerned with lesser and lesser degrees of hazard. In many cases the limit of detection of overt changes already has been reached and work has begun on the development of biochemical, immunological and neurological techniques which will detect earlier changes in body physiology. In addition, use must be made of statistical techniques which take advantage of group response to exposure as a more sensitive and reliable indicator of change.

3. An increasing number of agents are being identified as producing long-range, chronic, carcinogenic or genetic effects. Increased emphasis must be placed on the study of these materials lest inclusion of false positives in this group place an unwarranted financial burden on the users and the omission of false negatives subject our industrial population to unsuspected risk.

4. Accidents involving the increasingly important human factor will not be prevented by the conventional engineering approach. Greater emphasis must be placed on a new field of specialization called "human factors engineering" to develop the principles and laws governing the man-machine complex. Psychologists, anthropologists, physiologists, epidemiologists, and biostatisticians must team up with the safety engineer and bring their talents to bear on those new safety problems which our burgeoning automated society is imposing on us.

APPENDIX I, II, III

APPENDIX I

Geographical Distribution of Delegates Attending the President's Conference on Occupational Safety, March 6, 7, 8, 1962

Alabama -----	18	New Jersey -----	121
Alaska -----	3	New Mexico -----	6
Arizona -----	6	New York -----	358
Arkansas -----	14	North Carolina -----	62
California -----	85	North Dakota -----	2
Colorado -----	20	Ohio -----	154
Connecticut -----	65	Oklahoma -----	18
Delaware -----	28	Oregon -----	7
District of Columbia -----	919	Pennsylvania -----	182
Florida -----	61	Puerto Rico -----	16
Georgia -----	30	Rhode Island -----	17
Hawaii -----	7	South Carolina -----	21
Idaho -----	6	South Dakota -----	3
Illinois -----	168	Tennessee -----	28
Indiana -----	73	Texas -----	73
Iowa -----	28	Utah -----	9
Kansas -----	26	Vermont -----	2
Kentucky -----	26	Virginia -----	104
Louisiana -----	41	Washington -----	21
Maine -----	16	West Virginia -----	41
Maryland -----	283	Wisconsin -----	49
Massachusetts -----	67	Wyoming -----	4
Michigan -----	67	Foreign :	
Mississippi -----	9	Canada -----	8
Missouri -----	53	Ceylon -----	1
Montana -----	6	China -----	1
Nebraska -----	20	Panama -----	2
Nevada -----	1		
New Hampshire -----	8		
		Total -----	3,494

APPENDIX II

Representation of Delegates Attending the President's Conference on Occupational Safety, March 6, 7, 8, 1962

1. Industry_____	1, 338
A. Presidents of companies_____	106
B. Vice presidents_____	64
C. Safety directors_____	438
D. Medical personnel_____	108
E. Trade associations_____	146
F. Other_____	476
2. Labor_____	483
3. Government_____	1, 079
A. Federal_____	802
B. State_____	168
C. County and municipal_____	109
4. Insurance_____	99
5. Education_____	187
6. Safety Councils (includes Federal Safety Councils)_____	82
7. Professional groups_____	40
8. Publications and radio_____	29
9. Medical (other than Industry and Government)_____	68
10. Other_____	89
	<hr/>
	3, 494

Percentages

Industry _____	38
Labor _____	14
Government _____	31
Other _____	17

APPENDIX III

PRESIDENT'S CONFERENCE ON OCCUPATIONAL SAFETY

General Chairman : ARTHUR J. GOLDBERG, Secretary of Labor
Conference Policy : JAMES J. REYNOLDS, Assistant Secretary of Labor
Executive Director : REED O. HUNT, President, Crown Zellerbach Corp.
Bureau of Labor Standards Secretariat :
ARTHUR W. MOTLEY, Director
GEORGE T. BROWN, Deputy Director

TECHNICAL ADVISORY COMMITTEE

- *VINCENT P. AHEARN, Managing Director, National Sand and Gravel Association.
- *CYRIL AINSWORTH, Deputy Managing Director, American Standards Association, Inc.
- *A. C. BLACKMAN, Managing Director, American Society of Safety Engineers.
- *DR. LEON BRODY, Director of Research, Center for Safety Education, New York University.
JAMES A. BROWNLOW, President, Metal Trades Department, AFL-CIO.
CAPT. G. H. E. BUXTON, Director, Safety Bureau, New York Shipping Association, Inc.
- *JOHN CONNORS, Executive Secretary, Committee on Safety and Occupational Health, AFL-CIO.
JOHN M. CONVERY, Industrial Relations Division, National Association of Manufacturers.
- *F. H. DEEG, Director, Accident Prevention Department, National Association of Mutual Casualty Companies.
HENRY N. DOYLE, Division of Occupational Health, Office of the Surgeon General, Public Health Service, U.S. Department of Health, Education, and Welfare. (American Conference of Governmental Industrial Hygienists)
- WILLIAM W. EVERETT, JR., Assistant Secretary, Woodward and Lothrop, Inc. (National Retail Merchants Association)
- CHARLES FERGUSON, Director, Safety Division, United Mine Workers of America.
- *R. H. FERGUSON, Assistant Director, Industrial Relations, Republic Steel Corporation.
MICHAEL FOX, President, Railway Employees' Department, AFL-CIO.
Alternate: IRVIN L. BARNEY, National Legislative Representative, Brotherhood of Railway Carmen of America.
- GERARD O. GRIFFIN, Manager, Hazard Control, Dravo Corp.
- *SIDNEY W. GRIMES, Managing Director, Pacific Coast Association of Pulp and Paper Manufacturers.
- *ROBERT HAGOPIAN, Assistant Manager, Accident Prevention Department, Association of Casualty and Surety Companies.

*Member, 1962 Program Planning Committee.

*BRIG. GEN. HENRY J. HOFFER (Ret.), Assistant General Manager, National Safety Council.

HAROLD E. LANE, Vice President, Labor Relations and Personnel, Sheraton Corporation of America. (American Hotel Association)

GEORGE LUEDKE, Corporation Safety Director, Raytheon Company. (Electronic Industries Association)

WILLIAM E. DUNN, Executive Director, The Associated General Contractors of America, Inc.

Alternate: ARTHUR J. SCHMUHL, Safety Director.

*CARL J. MATTEI, Director, Division of Industrial Safety Service, New York Department of Labor.

*GEORGE D. MCCAULEY, Safety Officer, National Aeronautics and Space Administration. (Federal Safety Council)

DAVID J. McDONALD, President, United Steelworkers of America.

PETER M. MCGAVIN, Executive Secretary-Treasurer, Maritime Trades Department, AFL-CIO.

WILLIAM J. MCSORLEY, JR., Assistant to the President, Building and Construction Trades Department, AFL-CIO.

*MRS. ANNE MURPHY, R.N., Corporate Staff Nurse, Medical Services Department, Scott Paper Co. (American Association of Industrial Nurses)

DR. WILLIAM W. MUTCH, Naval Research Laboratory, Office of Naval Research, U.S. Department of the Navy. (Health Physics Society)

FRANCIS J. O'CONNELL, Washington Representative, Transport Workers Union of America, AFL-CIO.

JAMES E. O'NEIL, Director of Industrial Service, National Society for the Prevention of Blindness.

J. U. PARKER, Chief Safety Engineer, Humble Oil and Refining Co. (American Petroleum Institute)

CHARLES W. PUTNAM, Chairman, D.C. Minimum Wage and Industrial Safety Board.

Alternate: FRED C. THOMAS, Director, Industrial Safety Division, D.C. Minimum Wage and Industrial Safety Board.

J. SHARP QUEENER, Manager Safety and Fire Protection Division, E. I. duPont de Nemours & Co. (National Fire Protection Association)

*HARRY SEE, Safety Director, Brotherhood of Railroad Trainmen. (Railway Labor Executives Association)

REUBEN SIVERSON, Manager, Department of Manufacture, Chamber of Commerce of the United States.

*CALVIN K. SNYDER, Executive Vice President, American Retail Federation.

F. G. STEPHENSON, Secretary, General Safety Committee, Manufacturing Chemists' Association, Inc.

ELWOOD D. SWISHER, Vice President, Oil, Chemical and Atomic Workers International Union.

**LEO TELOW, Assistant Vice President, American Iron and Steel Institute.

F. A. VAN ATTA, United Automobile Workers, AFL-CIO. (Industrial Union Department, AFL-CIO.

RICHARD F. WALSH, Vice President, AFL-CIO, and Chairman, Committee on Safety and Occupational Health.

DR. R. LOMAX WELLS, Medical Director, Chesapeake & Potomac Telephone Cos. (Industrial Medical Association)

*Member, 1962 Program Planning Committee.

**Chairman, 1962 Program Planning Committee.

*HUNTER P. WHARTON, General Secretary-Treasurer, International Union of Operating Engineers, AFL-CIO.

Alternate: REESE HAMMOND.

JOHN F. WYMER, JR., Administrator, Good Samaritan Hospital, West Palm Beach, Fla. (American Hospital Association)

*DR. WILLIAM P. YANT, Director of Research and Development, Mine Safety Appliances Co.

Federal Resources Section

EWAN CLAGUE, Commissioner of Labor Statistics, U.S. Department of Labor.

Alternate: FRANK S. McELROY, Chief, Division of Industrial Hazards.

ROBERT D. GIDEL, Chief, Division of Safety, Bureau of Labor Standards, U.S. Department of Labor.

D. F. HAYES, Chief, Safety and Fire Protection, U.S. Atomic Energy Commission.

GERARD H. HUFFMAN, Deputy Administrator, Federal Extension Service, U.S. Department of Agriculture.

H. R. LONGHURST, Assistant Director, Bureau of Safety and Service, Interstate Commerce Commission.

DR. HAROLD J. MAGNUSON, Chief, Division of Occupational Health, Public Health Service, U.S. Department of Health, Education, and Welfare.

WILLIAM G. MARKS, Deputy Director, Office of Administrative Operations, U.S. Department of Commerce.

WILLIAM C. POPE, Chief, Branch of Safety Engineering, U.S. Department of the Interior.

CAPT. JAMES T. RIORDAN, USN, Chief, Safety Division, Office of Industrial Relations, U.S. Department of Defense.

DR. JOHN P. WALSH, Director, Trade and Industrial Education Branch, Office of Education, U.S. Department of Health, Education, and Welfare.

DR. WILFORD L. WHITE, Director, Office of Management and Research Assistance, Small Business Administration.

Alternate: WENDELL O. METCALF, Deputy Director, Office of Management and Research Assistance, Small Business Administration.

President's Conference Staff

LUCILLE J. BUCHANAN, U.S. Department of Labor

JAMES E. DEMPSEY, U.S. Department of Labor

R. CAMPBELL STARR, U.S. Department of Labor

*Member, 1962 Program Planning Committee.

